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ROYAL BOTANIC GARDENS, KEW.

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XXXII.—CONTRIBUTIONS TO THE FLORA OF MACEDONIA: I.

W. B. Turrill.

The present contribution to the flora of Macedonia is based on collections made, in their spare time, by men engaged on active service with the British Salonika Forces. It is not necessary to emphasise the difficulties of preparing and dispatching herbarium specimens under these conditions, but the results, as set forth in this paper, show that it can be done with a considerable amount of success, and will, it is hoped, not only encourage those who are still collecting, but induce others to help in the botanical exploration of Macedonia, a country whose flora has hitherto been less known than that of any other Balkan district.

Since it is not yet possible to publish a complete flora of Macedonia, the writer is saved the considerable trouble of defining the boundaries of an area which for hundreds of years has had no political entity. The following notes on topography, geology, meteorology, and ecology, deal only with the district between Salonika and the Struma Plain and Krusa Balkan traversed by the writer, and in which most of the plants enumerated below were collected.

Geology and Physiography.

A general account of the geology and physiography of Macedonia and southern Serbia is given by J. Cvijic, "Grundlinien der Geographie und Geologie von Mazedonien und Altserbien," in Petermann's Geogr. Mitteilungen, Erg.-Bd., 34, Nr. 162. The following remarks are based entirely on personal observations and field-notes.

The mountain chains in the eastern Balkans run mainly east and west or north-west and south-east, and this is true not only for the great ranges of the Balkan and Rhodope Mountains but also for the smaller ranges of hills immediately to the north of Salonika, viz., the "Lembert Hills," the Krusa Balkan, Kara-dagh, Bechik-dagh, Belachica Planina, etc. The main trend of the intervening plains is consequently in the same

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direction, as, for instance, the Langaza Plain, the Struma Plain, the Butkova and Strumitza valleys. This orientation of the mountains, which is continued in western Asia Minor, has doubtless had considerable influence in the distribution of the plants of this region.

The greater part of the district with which we are immediately concerned consists of plutonic and metamorphic igneous rocks, either actually cropping out on the surface or overlaid by diluvium or alluvium. These rocks are entirely crystalline, consisting of various minerals in varying proportions, but with quartz and mica dominant. The writer found crystals several inches across of this last mineral. Often the mineral constituents are arranged in a foliated manner, and the result is a schist, generally a mica-schist. To the east and south-east of the town of Salonika is an outcrop of crystalline limestone. This stretches northwards nearly to Langaza Lake, and is quarried for road metal to make up the Seres Road and other roads in the immediate vicinity of Salonika. Mount Hortac is largely composed of this rock.

To the east of the Gulf of Salonika the deltas of the Galiko and Vardar are formed of alluvium brought down by these rivers, and the Struma Plain (15 km. wide) is largely filled up with river-borne deposits. To the north-west of Salonika up to the lines of the "Lembert Hills," and further to the west for some distance up the Galiko and Vardar Valleys, a diluvial deposit of varying composition overlies the plutonic rocks. This deposit was met with again on the northern slopes of the Karadagh (really an eastern continuation of the Krusa Balkan) and in the valleys immediately to the south of the Krusa Balkan near Karamudli. Generally it is formed of intermixed stones and pebbles of igneous origin and brown earth more or less sandy in nature. The stones and pebbles are sometimes deposited in layers, but often quite irregularly scattered in the sandy earth, sometimes distinctly water-worn, most often with sharp contours and showing little sign of water action. The whole forms a very loose deposit in which storms and streams have carved deep irregular ravines, "nullahs," sometimes reaching a depth of 40 or 50 ft. One cannot help concluding that at no very distant period great water forces caused these deposits, and that the volume of the water coming from the hills and mountains must have been much greater than that now brought down by the hill streams, most of which seem scarcely able to cut a way through even soft deposits. As in most mountainous districts, a big thunderstorm or other heavy fall of rain causes the streams to increase many times their volume and power in the space of a few hours, as was witnessed in the case of the River Spanc and its tributaries, but even so present conditions fail to account for the extensive diluvial deposits.

On the southern slopes of the "Lembert Hills" a very hard conglomerate composed of large, rounded, igneous pebbles embedded in a fine matrix was found. Projecting masses and boulders of this were covered with lichens and a few mosses, but the latter especially, probably owing to the extreme dryness of the summer, appear to be far from abundant in Macedonia.

On the hill sides soil is either absent or thin and patchy, but the alluvium and diluvium of the valleys and plains give a very rich soil, and it is on such that the farms and villages are for the most part situated.

Water-supply varies with the district. Round Salonika water is scarce and the supply for domestic purposes is obtained either from wells or from the few hill streams. Inland small streams supply water for the flocks, and in the vicinity of every village several shallow wells supplying water all the year have been made, mostly in the banks of streams or sides of nullahs; in some cases hill-side springs have been tapped. The writer analysed a considerable number of water samples in the Karamudli district to the south of the Krusa Balkan, and in all a distinct trace of dissolved iron was discovered, and at times a noticeable taste was imparted by it to the water. Particles of mica generally occur in the spring or well water, and a milkiness due to hydrous silicate of aluminium ("China clay") may sometimes be observed, especially after storms.

Climate.

The chief characteristics of the Macedonian climate are a hot, dry summer and a winter with variously alternating snowy, wet, fine, warm and cold periods. The hot weather usually commences about the middle of May and continues till September. The summer days are generally cloudless and hazy, and such rain as occurs falls usually during local thunderstorms, which are sometimes very severe. July and August are the driest months, while September is also frequently dry. Long spells of drought, lasting from two to six weeks, may occur at any time during the summer. Thunderstorms are most frequent in May and June, increasing in frequency as one moves inland. During the summer the winds are, as a rule, light, with marked diurnal variations, but occasionally strong "Vardar winds" blow from the north or north-east, often lasting for several days, as, for example, in the middle of August last year, when Salonika was burning. In the inland valleys the temperature is frequently higher than on the coast, but nights are cooler inland, and the atmosphere is less moist. A heat haze is common in the early part of the day in the low-lying districts, and in the Struma Plain it has been nicknamed the "Struma Sea."

Winter commences towards the end of October. Warm spells generally follow the first cold period and occur at intervals during the winter. From November to March a succession of more or less intense pressure disturbances affect the Balkan Peninsula, and during these months gales, heavy rainstorms, dull drizzling days, or severe frosts, with short intervals of fine weather are experienced, and mists and fogs are common. The early months of winter are the wettest of the year. The first snow of the winter 1917-1918 was seen on the summits of Mt Olympus on the morning of October 15th, but disappeared during the day, finally coming to remain for the winter on October 24th. The severity of the winter weather increases rapidly as one recedes from the coast, and is especially severe in lofty

regions. Falls of snow may occur from November to April, and are heavier and more frequent inland. January is the month of greatest snowfall, and is, in general, the coldest month. Strong winds are most frequent in January and February, and least in June. The Vardar wind becomes particularly strong as it descends the trough of the Vardar, and frequently accompanies a sudden rise of the barometer. It is a dry wind, accompanied by hard, clear skies. In winter, coming from the snow-clad mountains, it is a cold wind, and even in summer it is usually cool, but the relief afforded by it is minimized, at least along the roads and in camps, by the clouds of gritty dust it raises.

Spring and autumn are both of short duration. The former may be said to cover the months of March and April, and perhaps a part of May, and the latter the end of September and October.

The following table, compiled from statistics given in the "Calendar for 1918, Meteorological Section, R.E., B.S.F." shows the mean, maximum, and minimum temperature and rainfall for each month at Salonika, as based on a series of observations extending from 1893 to 1917:—

	Temperature.			Rainfall.		
	Mean Daily.	Absolute Maximum.	Absolute Minimum.	Average.	Maximum.	Minimum.
January ...	42°F.	67°F.	19°F.	1·47 ins.	3·70 ins.	0·12 ins.
February...	45°F.	70°F.	15°F.	1·42 ins.	4·23 ins.	0·11 ins.
March ...	50°F.	79°F.	27°F.	1·63 ins.	3·21 ins.	0·07 ins.
April ...	57°F.	86°F.	33°F.	1·89 ins.	5·45 ins.	0·23 ins.
May ...	67°F.	96°F.	44°F.	2·36 ins.	6·77 ins.	0·00 ins.
June ...	74°F.	101°F.	53°F.	1·73 ins.	4·09 ins.	0·12 ins.
July ...	80°F.	103°F.	55°F.	1·00 ins.	3·50 ins.	0·03 ins.
August ...	78°F.	105°F.	59°F.	1·22 ins.	2·96 ins.	0·02 ins.
September	72°F.	99°F.	46°F.	1·58 ins.	6·05 ins.	0·06 ins.
October ...	64°F.	88°F.	33°F.	2·09 ins.	6·28 ins.	0·06 ins.
November..	52°F.	79°F.	25°F.	2·71 ins.	8·05 ins.	0·26 ins.
December...	46°F.	71°F.	23°F.	2·40 ins.	5·33 ins.	0·82 ins.

The mean annual temperature is, in accord with the latitude, distinctly warm, viz., 60·6° F., the average monthly mean ranging from 80° F. in July to 42° F. in January. The absolute extremes of temperature recorded are 105° F. in August and 15° F. in February (17° of frost). The total average annual rainfall of 21·5 inches is relatively small for a latitude where the amount of evaporation is necessarily great.

The following additional information, extracted from an article "Sul clima di Salonicco" in Bollettino della Societa Geografica Italiana, December 1916, may be of interest to the ecologist. The rainfall is distributed over 97 days of the year, the wettest month being November, which is also the month during which the heaviest rainfall in 24 hours (3·3 ins.) has been recorded. Thunderstorms occur on some 28

days, the highest monthly figure averaging for May 5·6, June 7·2, July 4·8, and August 3·4 ins. The relative humidity of the air is rather low—65 per cent. on the average of the year—varying between 74 per cent. in December and 54 per cent. in July, whilst the greatest amount of cloud also occurs during the damp month of December, and the least during July and August. The observations of barometric pressure refer to a period of only seven years, but they appear to indicate a principal maximum in November and minimum in July, with a secondary maximum in June and minimum in May.

It is important to remember that all the figures given above refer to observations taken at Salonika, not in the Macedonian hinterland.

Agriculture.

When peaceful conditions return to Macedonia to allow of its economic development, the first place in this will probably be given to agriculture, especially when modern methods are introduced, and rail and road communications permit of quick and secure distribution of produce. At present, cultivation is only carried on in limited areas and by primitive means. For instance, little or no rotation of crops is observed, but land is often allowed to lie fallow for several years, and the only 'dressing' the fields commonly receive is the treading of sheep in spring and autumn. The ground is broken to-day, as it was 2000 years ago, by a one-handled wooden plough, generally made from a single tree trunk and drawn by a pair of oxen or buffaloes. Sowing is accomplished by making a hole with the big toe for each grain, or the seed is merely scattered over the stubble and ploughed in. The soil is naturally very fertile in many of the valleys and plains, and in the middle of July, near the Turkish village of Jeni mah, the writer has seen natives sowing maize immediately after a wheat crop had been reaped—before even the sheaves had been carried. Two shallow-rooted cereal crops in one season, without the application of any fertilizers, could only pay on an extremely rich soil. Reaping, of course, is done by hand, and the unbound sheaves are threshed by the tramping of animals (oxen, cows, donkeys, ponies) round and round the smooth threshing-floor of hardened mud, generally dragging after them a portion of a tree-trunk, which acts as a wooden roller, or a piece of flat timber like a sledge, slightly turned up in front and with a man or children sitting thereon. The grain is winnowed by the mixture of straw and grain being thrown up into the air with forks of several broad prongs, or with wooden shovels. The cereals chiefly cultivated are wheat (bearded and non-bearded varieties), maize, barley, and oats.

Tobacco cultivation is an important industry in Macedonia, and many fields of it are grown in most districts. In the villages the gathered leaves are strung in rows and hung to ferment under the eaves of houses and walls. Cotton has been grown in the Struma Plain and elsewhere. Round Langaza and in other districts the opium poppy is cultivated. For an analytical account of the opium grown in Serbian Macedonia a paper by

Brunetti, quoted in Pharm. Journ., Aug. 31st, 1918, may be consulted. Viticulture is an important industry in the Struma Plain. Several kinds of grapes are grown for wine-making and for manufacture into raisins.

Fruit cultivation should be a financial success in Macedonia if good varieties of trees were introduced and markets rendered available. Many of the fruits are small and evidently little or not at all removed from wild types. In June abundance of luscious cherries—red, white, and black—may be gathered near most villages. In July, plums, pears, and peaches of several kinds are ripe, as is also a small kind of apricot and the white mulberry. Later, quinces, pomegranates, grapes, and figs ripen. Water-melons are brought to perfection in Macedonia, and an interesting account of their cultivation is given in the Gard. Chron., June 1st, 1918, p. 225.

Forestry is non-existent in Macedonia. The scarcity of trees is most noticeable, especially in the district around Salonika. The "Lembert Hills" are absolutely bare except for the shrubby *Quercus coccifera* formation and low herbage. Inland, trees occur, but nearly always singly or in small groups, seldom worthy of the name of woods. *Quercus conferta* seems the tree most frequently used for house timber in the inland districts. It is the commonest tree in many districts and also occurs as a nullah shrub. In the Struma Plain, elm trees reach a good size, and isolated planes are well developed in various localities. The comparative scarcity of trees is probably due to several causes. In the first place the Turks have burnt, or otherwise destroyed, many forests in the Balkans, in their wars with brigands and insurgents of various kinds (see Velenovsky, Fl. Bulg., Suppl. 1. 1898, p. 330). Much timber has been used by the inhabitants for house-building, plough and cart making, etc., and for firewood and charcoal burning, and no trees are systematically planted in the place of those cut down. The flocks of sheep and goats of the nomad shepherds wandering over the hill country, prevent new woods springing up naturally, by nibbling down the young shoots, for in the dry summer, when every blade of grass on the hills is scorched and brown, any young vegetation forms food for the scraggy animals. Lastly the severe winter winds are not encouraging to tree growth.

Ecology.

As a field-collector, the writer found it convenient to divide the flora up into three main divisions, according to the topography of the ground, hill and foothill floras, nullah flora, and plain flora.

Hill and foothill floras.—These were studied on the "Lembert Hills" and Krusa Balkan. The foothill flora in some respects links the hill flora to that of the plains, and, of course, there is no sharp line of demarcation, but since the hills explored nowhere reach above 1000 m. there is no alpine vegetation to consider, and no need to discuss their flora separately from that of their foothills. Undoubtedly the most striking plant

is the Kermes oak, *Quercus coccifera*, which is found on nearly all dry hill slopes, and there constitutes a distinct formation, the "Formatio Quercus cocciferae" of Halácsy. This is related to the "macchie" (maquis) common in many Mediterranean countries, but is of much purer composition. The *Quercus* on the hill-slopes never becomes more than a shrub, 2-6 ft. in height, with very stiff prickly leaves. In April and May the bushes flower more or less freely and the comparatively large acorns are ripe in October. An account of the plant as the host of the "Kermes" insect, which yields a crimson dye material, is given in the *Kew Bulletin*, 1910, pp. 167-169. Amongst the shrubs a large number of annual plants come to maturity, for here their seedling stages are protected from sheep and goats, and a certain amount of moisture is protected from the sun's rays and ensured to their roots. Associated plants include *Asparagus acutifolius*, the tall *Dracunculus vulgaris*, whose inflorescence makes itself conspicuous by its size, colour, and disagreeable odour, *Silybum Marianum* with its variegated green and white leaves, species of *Astragalus*, *Lathyrus*, *Vicia*, and other *Leguminosae*, *Silene* spp., *Dianthus* spp., *Delphinum* spp., *Plumbago europaea* (autumn flowering), *Carduus* spp., and allied thistles, *Aspodelus albus*, *Carex* spp., *Scrophularia* spp., *Verbascum* spp., and various grasses. The bushes are commonly in patches of greater or less extent, and between these are the stony slopes, more or less covered with a short turf of xerophytic grasses, amongst which spring up bulbous plants, or those with corms or rhizomes, *Ornithogalum*, *Romulea*, *Gagea*, *Crocus*, *Muscari*, *Anemone*, etc., or annuals which flower in the spring and ripen their seeds before the summer sun scorches them brown. These latter include *Medicago* and *Trifolium* spp., and numerous other *Leguminosae* common to all the Mediterranean floras, *Myosotis idaea* and *M. collina*, *Helianthemum salicifolium*, *Euphorbia* spp., *Draba verna*, *Alyssum* spp., *Lithospermum apulum*, *Arenaria* spp., and *Cerastium glomeratum*. On the southern slopes of the "Lembert Hills" scarcely any other shrubs accompany the *Quercus coccifera*, but on the northern slopes of the Krusa Balkan the formation passes into a mixed one of evergreen and deciduous shrubs. *Juniperus Oxycedrus* is sometimes as common as *Quercus coccifera*, and other shrubs include *Fraxinus Ornus*, *Pistacia Terebinthus*, *Rhus Cotinus*, *Cornus sanguinea*, *Acer campestre*, *Crataegus*, *Rosa* and *Rubus* spp. Sometimes, especially in the hollows, *Quercus conferta* (as a shrub), *Jasminum fruticans*, *Paliurus Spina-Christi* and *Carpinus duinensis* are found. On the foothills occur clumps of *Paliurus*, sweetbriar, *Crataegus*, *Cistus*, *Linum flavum*, var. *thracicum*, *Jasminum fruticans*, *Ligustrum vulgare* and in the intervening turf aromatic *Labiatae* abound (such as *Thymus* spp., *Salvia* spp., *Calamintha suaveolens*, *Stachys* spp., *Mentha* spp.). *Marsdenia erecta* is a conspicuous plant amongst the hill scrub when in flower, its low bushes, 2-3 ft. in height, being covered with dense white masses of flowers, which emit a strong scent not unlike that of elder. *Anchusa italica* and *Lotus aegeus* are noteworthy for their beauty, as is also *Nigella*

damascena, with its dark blue flowers growing amongst the tall grasses round bushes. *Melica ciliata*, with its long inflorescence of silky white spikelets, stands high above the tangled masses of Rubi sprawling over sweetbriar and other shrubs. The hill slopes are often destitute of anything approaching a compact formation of shrubs. The vegetation is then limited to quickly-fruiting annuals, spring and autumn flowering perennials with strong underground parts, and plants with special protection against the dry summer. Thus, on the southern slopes of the Krusa Balkan, near Karamudli, summer-flowering plants include *Allium pulchellum*, *Digitalis lanata*, *Teucrium Polium*, *Dorycnium intermedium*, *Stachys* spp., *Daucus setulosus*, *Trifolium* spp., *Centaurea* spp., thistles, *Hypericum olympicum*, *Dianthus* spp., *Ononis antiquorum* and, most noticeable of all, species of *Verbascum*, which stand up on hill-sides like grey and yellow sentinels, their vegetative parts and inflorescence covered with a dense tomentum of stellate hairs.

Nullah flora.—Macedonian "nullahs" are structurally of two types, those worn out of the solid rocks of the hills and those cut out of the diluvium of the foothills and plains by streams and storms. They may or may not have a small stream flowing permanently or intermittently through them. Most often they have exceedingly steep sides, and vary in width from 2 or 3 to 20 or 30 yards. Floristically they have this feature in common, that they maintain a flourishing vegetation throughout the hot summer. The steep sides serve as a protection from the sun for at least part of the day, water drains in from the higher levels, and considerable moisture is retained even if no stream runs through them. From higher ground their courses may be traced in summer as winding lines of green shrubs. Common shrubs are *Quercus conferta*, *Fraxinus Ornus*, *Rhus Cotinus*, *Colutea arborescens*, *Coronilla emeroides*, *Carpinus duinensis*, *Cornus sanguinea*, *Tilia argentea*, *Sambucus Ebulus*, and climbers and scramblers are common, including *Lonicera etrusca*, *L. Caprifolium*, *Periploca graeca*, and *Clematis* spp. Besides the ordinary hill and plain plants which find refuge in the nullahs and flower there most of the summer, a number of plants are especially characteristic of these places. Such are *Campanula persicifolia*, *Agrostemma Coronaria*, *Sedum* spp., *Genista* spp., and *Cytisus* spp. A marsh flora may be found on the stream-sides when water permanently runs through the nullah: *Lythrum Salicaria*, *Cyperus longus*, *Juncus*, *Carex*, *Eleocharis*, *Scirpus*, etc., occurring as marginal vegetation to the stream.

Plain flora.—The plains form the richest agricultural land and much of the ground is or has been under cultivation. Many of the fields, however, are purposely left fallow some seasons, and at present numbers are neglected through the exigencies of war. The weed flora is luxuriantly developed in these, and the colour effect is often striking through the masses of flowers of weeds and derelict cultivated plants. Fields of scarlet poppies, pink Silenes, yellow *Hypecoum*, and blue *Lupinus angustifolius* and *Specularia Speculum* spread a

variegated carpet over the Struma Plain in spring. Other common weeds of cultivation include: *Ranunculus arvensis*, blue and scarlet pimpernel, *Euphorbia* spp., *Adonis*, *Glaucium phoenicium*, *Roemeria hybrida*, *Vicia* spp., *Medicago* spp., *Sisymbrium* spp., *Filago arvensis* and *F. germanica*. Between and in the fields are clumps and hedges of *Paliurus Spina-Christi*, *Tamarix tetrandra*, *Jasminum fruticans*, *Rosa* spp., etc. On the banks of the Struma and in the neighbouring swamps a typical marsh flora is developed: *Phalaris arundinacea*, *Iris pseudacorus*, species of *Cyperus*, *Scirpus* and *Juncus*, *Eleocharis palustris*, *Orchis palustris*, etc. Trees of *Salix alba* overhang its banks in places.

As stated above, the parts of Macedonia traversed by the writer are for the most part poor in tree growth. Unfortunately, too, the collection of bulky woody specimens was often curtailed by considerations of weight and available space inside one's pack. Carefully collected specimens of Macedonian trees would be welcomed at Kew. The genera *Prunus* and *Pyrus* should prove very interesting, and when possible flowers, fruits and foliage should be obtained in their different seasons from the same tree. Full notes giving habitat, dates of flowering and fruiting, height and habit of tree, and the diameter of its trunk at six feet from the ground would materially add to the value of the specimens. The following species and genera of trees were observed in addition to cultivated fruit trees: *Quercus conferta*, *Platanus orientalis*, *Populus*, *Salix alba*, *Ulmus*, *Pyrus*, *Prunus*, *Juglans regia*. No coniferous trees were found, but only *Juniperus Oxycedrus* as a shrub.

Floral Succession.

The Macedonian climate, while typically Mediterranean in the long, hot, dry summer, differs from the climates of most other countries bordering this sea in having colder and wetter spells in winter. The spring comes with a rush in March, and merges into summer in May. The hot weather continues till September, and in October the autumn rains revive the parched vegetation and cause a short period of flowering in autumn before the cold winds and snow of winter herald the other extreme from the heat of summer.

The following lists include only the commoner and more interesting plants observed in flower in the successive months.

Jan.-Feb.—*Fumaria officinalis*, *Draba verna*, *Myositis idaea* and *M. collina*, *Euphorbia* sp., *Gagea stenopetala*, *Romulea Bulbocodium*, and *Crocus* sp. The young rosettes of *Silybum marianum* are conspicuous.

March.—*Capsella Bursa-pastoris*, *Sisymbrium Thalianum*, *Leontice Leontopetalum*, *Anemone* spp., *Cerastium glomeratum*, *Viola arvensis*, *Lamium amplexicaule*, *Euphorbia* spp., *Muscari* spp., and *Ornithogalum* spp., in addition to the plants mentioned in the last paragraph, were found in flower.

April.—The spring flora is in its full glory this month. *Leguminosae* are more numerous in flowering species and individuals than the representatives of any other family. *Vicia* spp., *Lathyrus* spp., *Pisum* spp., *Medicago* spp., *Trifolium* spp.,

Astragalus sesameus, Biserrula Pelecinus, Hippocrepis, Scorpiurus, Ornithopus, Lupinus, Orobus, spp., etc., occur everywhere on the hills and in the plains, and *Colutea arborescens, Coronilla emeroides, Cytisus* and *Genista* spp., were flowering in the nullahs. *Ranunculus rumelicus, R. arvensis, Hypecoum grandiflorum, Roemeria hybrida, Glaucium phoeniceum, Adonis, Papaver* spp.. *Cistus villosus, Linum flavum,* var. *thracicum, Tamarix tetrandra, Helianthemum salicifolium, Alsine setacea, Silene Harrisii* and other species, *Prunus* and *Pyrus* spp., *Scandix, Scleranthus* spp., *Tragopogon* spp., *Anthemis* spp., *Chrysanthemum* spp., *Campanula phrygia,* var. *serbica, Specularia Speculum, Jasminum fruticans, Valerianella membranacea, Anagallis* spp., *Convolvulus* spp., *Lithospermum* spp., *Linaria simplex* and *L. Pelisseriana, Sideritis montana, Salvia Horminum, Thymus Marschallianus, T. macedonicus, Cerinthe major, Muscari comosum, Ajuga Chamaepytis, Asphodelus albus.* Many Grasses were just coming out, including species of *Poa, Avena, Aegilops, Bromus,* etc.

May.—Many of the April plants continue flowering. Additional plants which flower this month and give an important facies to the vegetation include:—*Kohlrauschia prolifera, K. velutina, Dianthus quadrangulus, D. tenuiflorus, Velezia rigida, Nigella* spp., *Hedypnois cretica, Nonnea ventricosa, Silybum Marianum, Delphinium paniculatum, Hypericum* spp., *Trifolium* spp., *Vicia* spp., *Lathyrus* spp., *Astragalus* spp., *Lotus aegeus, Dorycnium intermedium, Genista depressa, Onobrychis* spp., *Scutellaria* spp., *Cnicus benedictus, Malva* spp., *Cornus sanguinea, Alyssum micranthum, A. desertorum, Stachys plumosa Calamintha suaveolens, Ziziphora capitata, Thymus* spp., *Melittis, Sideritis* spp., *Heliotropium suaveolens, Anchusa* spp., *Echium* spp., *Cynoglossum pictum, Ophrys* spp., *Orchis* spp., especially *O. hircina, Papaver* spp., *Achillea* spp., *Xeranthemum annuum, Sonchus* spp., *Crepis* spp., *Hieracium* spp., *Zacyntha verrucosa, Rhus Cotinus, Paliurus Spina-Christi, Orobanche* spp., *Geranium* spp., *Carex* spp. (in fruit), *Marsdenia erecta, Periploca graeca, Digitalis lanata, Lysimachia punctata, Linaria* spp., *Scabiosa* and *Knautia* spp., *Rubus* and *Rosa* spp., *Campanula* spp. The grasses are in full flower this month:—*Bromus, Aegilops, Koeleria, Elymus, Melica, Chrysopogon Gryllus,* etc.

June.—*Compositae* and *Labiatae* become the dominant orders this month. Amongst the former may be mentioned *Centaurea* spp., *Carthamnus* spp., *Anthemis* spp., *Inula* spp., *Filago* spp., *Xeranthemum* spp., *Scolymus hispanicus, Cichorium Intybus, Crupina vulgaris,* and *Asteriscus aquaticus.*

The *Labiatae* include *Prunella alba, Stachys* spp., *Phlomis samia, P. pungens,* var. *laxiflora, Teucrium Polium* and *Nepeta nuda.* Other conspicuous plants are:—*Armeria Adamovicii, Hypericum olympicum, Vincetoxicum speciosum, Clematis* spp., *Linum* spp., *Tunica, Gypsophila, Dianthus* spp., *Nigella* spp., *Silene* spp., *Allium* spp., *Digitalis* spp., *Trifolium* spp., *Agrostemma Coronaria, Alyssum murale. Berteroa incana, Agrimonia Eupatorium, Achillea* spp., *Lavatera thuringiaca, Scrophularia Scopoli, Delphinium peregrinum, Jasione Heldreichii,* and *Crucianella graeca.*

July.—Most exposed vegetation, except that of marshy land, becomes scorched to a straw or pale-brown colour and, with few exceptions other than xerophytic plants, green vegetation and flowering specimens are limited to specially protected localities such as nullahs. Most of the spring and early summer plants have set and shed their seeds. Nevertheless a number of species come into flower this month and several continue flowering which reached their zenith in June. Typical July flowering plants include:—*Centaurea* spp., *Mentha* spp., *Saponaria* spp., *Daucus setulosus*, *Cichorium Intybus*, *Linaria* spp., *Verbascum* spp., *Betonica officinalis*, *Genista ovata*, *Lythrum Salicaria*, *Campanula* spp., *Allium* spp., *Inula* spp., *Hypericum olympicum*, *Tunica illyrica*, *Ononis antiquorum*, *Melissa officinalis*, *Leonurus Cardiaca*, *Marubium peregrinum*, *Erythraea Centaurium*. *Epilobium* spp., *Sambucus Ebulus*, *Silene* spp., *Chondrilla juncea*, *Echinops microcephalus*, *Bupleurum laxum*, *Stachys germanica*, *Portulaca oleracea*, *Lactuca Scariola*, *Xanthium* spp., *Eryngium campestre*, *Nigella arvensis*, *Trifolium* spp.

Aug.-Sept.—These are resting months for the Macedonian vegetation. Very few fresh species come into flower, but a number of individuals of various plants remain here and there flowering or setting seed. *Carduus* and *Carlina* spp., *Cichorium* and other *Compositae*, *Delphinium* spp., *Silene* spp., *Dianthus* spp.

Oct.-Nov.—The autumn rains cause a fresh outburst of flowering, which is, however, small in the number of species. *Plumbago europaea*, *Scilla autumnalis*, *Colchicum*, *Taraxacum megalorrhizon*, *Cyclamen neapolitanum*, *Crocus pulchellus*.

Systematic List.

The plants enumerated in the systematic list were collected by the following persons in the localities given:—

Major G. W. Harris: several very interesting parcels totalling 418 specimens collected in the Struma Plain and Krusa Balkan in the spring and summer of 1918.

Sergt. J. M. Russell: 17 specimens collected in Gumus Dere, a river valley cutting through the Krusa Balkan into the Struma Plain, autumn of 1917, spring of 1918; 79 specimens collected in the Paprat District of the central Krusa Balkan, spring and summer of 1918.

Pte. A. F. Baker: 25 specimens collected for the most part apparently in the neighbourhood of Lake Doiran (Gugunci, etc.), and a few from near Mt. Hortac, but it has not been possible to trace all the localities.

The writer's own collections consisting of 550 specimens and 80 packets of seed made during 1917. Of the latter 40 species germinated and flowered at Kew in 1918. The collections were made in the following districts: at the foot of the "Lembert Hills" (Akbunar, etc.), about 8-10 km. north of Salonika; 6 km. north-east of Lahana; Struma Plain, near Orljak, Kopriva and Ormanli; northern slopes and foothills of the Krusa Balkan near Turica and Gumus Dere; Paprat, Mirova, etc., in the central Krusa Balkan; valley of the R. Spanc (a tributary of the R.

Galiko) at Snevce, Alexsia, etc.; southern slopes of the Krusa Balkan near Karamudli; top of the Krusa Balkan east and west of Baisili; between Karamudli, Moravca and Gramatna; Sarigol, near Kukus.

Throughout this paper the place-names are spelt as in the Austrian 1: 200,000 maps, Salonika and Vodena sheets, except that Saloniki is replaced by the more familiar Salonika. That some standard is necessary is shown by the varied spellings of quite well-known localities. Thus Mt. Hortac is variously given as Hortiac, Hortiach, Hortiasch, Kortiac, Khortiach, Korthiat, Chortiac, Cortasch, Corthiat, etc.

The distribution of each species is given as carefully as possible but further exploration of the Balkans will no doubt increase the known range of a great many species. The terms Greece, Maced., Alb., Mtn., Serb., Bulg., refer in all cases to the countries or districts of Greece, Macedonia, Albania, Montenegro, Serbia and Bulgaria, as these were understood before the "first" Balkan War of 1912. The following works have been consulted in working out the Balkan distribution of the species recorded:—

Halácsy, Conspectus Florae Graecae, 1900-1904. Suppl. I. 1908. Suppl. II. 1912.

Grisebach, Spicilegium Florae Rumelicae, 1843-1844.

Baldacci, Revista della Coll. Bot. Fatta nel 1897 nell' Albania Settentr., 1901.

Rohlena, Beiträge zur Flora Montenegro, 1902-1912.

Pančič, Flora Principatus Serbiae, 1874. Additamenta, 1884.

Velenovsky, Flora Bulgarica, 1891. Suppl. I. 1898. Nachträge, 1902, 1903, 1910.

Ranunculaceae.

Clematis Flammula, *L.*

Krusa Balkan, with rather small flowers, 6-18, *Harris*, 392; hills to south-west of Turica, in flower, 8-6-17, *Turrill*, 405.

Distr. S. Eur., N. Afr., Orient.

Balkans: Greece, Maced., Alb., Mtn.

Clematis Vitalba, *L.*

Between Turica and Kopriva, in flower, 4-6-17, *Turrill*, 370.

Distr. Cent. and S. Eur., N. Afr., Orient.

Balkans: General.

Cream-coloured flowers with a strong, pleasant scent.

Anemone stellata, *Lam.*

Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 126; Krusa Balkan, in flower, 6-18, *Harris*, 350; near Mt. Hortac, south-east of Salonika, in flower, 1-4-17, common, *Baker*, 8a; foothills between Turica and Kopriva, in flower and fruit, 30-4-17, *Turrill*, 126.

Distr. S. Eur., Orient.

Balkans: Greece, Maced., Bulg.

Anemone blanda, *Schott. et Kty.*

Abundant in spring on the hills north of Salonika, in flower, 2 & 3-17, *Turrill*.

Distr. Greece, Maced., Thrace, Orient.

Adonis flammea, *Jacq.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-17, *Harris*, 20, 225; Struma Plain, about 2 km. east of Orljak, with small, bright scarlet flowers and pale green fruits, 23-4-17, *Turrill*, 94.
Distr. S. Eur., Asia Minor and Syria.
Balkans: General.

Thalictrum aquilegifolium, *L.*
Krusa Balkan, in flower, 6-18, *Harris*, 361.
Distr. Cent. and S. Eur., Temp. Asia.
Balkans: General.
There seem no specific differences between this plant and *T. bulgaricum*, Vel. (Flora Bulgarica, p. 4).

Thalictrum angustifolium, *Jacq.*
Krusa Balkan, in flower, 6-18, *Harris*, 362.
Distr. Cent. and S. Eur., Asia Minor.
Balkans: General.

Thalictrum flavum, *L.*
Struma Plain and Krusa Balkan, in flower, 6-18, *Harris*, 224.
Distr. Eur., Temp. Asia.
Balkans: Mtn., Serb., Bulg., Thrace.

Ranunculus rumelicus, *Griseb.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, Harris, 134; 8-10 km. north of Saloniki, in flower, 13-4-17, *Turrill*, 22.
Distr. Greece, Maced., Serb., Bulg., Thrace, Anatolia.
A low-growing, densely hirsute buttercup, common amongst the grass, etc., of stony slopes.

Ranunculus psilostachys, *Griseb.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 223.
Distr. Greece, Maced., Serb., Bulg.
This species is very closely related to the previous one. It is, however, usually a taller plant, with larger flowers and the roots (napulae) are longer and gradually attenuated, not abruptly ending in fibrillae.

Ranunculus arvensis, *L.*
Struma Plain and Krusa Balkan, 4 & 5-18, *Harris*, 4; 8-10 km. north of Salonika, in flower, 13-4-17, *Turrill*, 33.
Distr. Widely distributed as a weed of arable land in Europe and Asia.
One of the commonest weeds of cultivation in Macedonia.

Ranunculus muricatus, *L.*
Between Turica and Kopriva, in flower and fruit, 30-4-17, *Turrill*, 128.
Distr. S. Eur., N. Afr., Orient.
Balkans: Maced., Mtn., Thrace.

Ranunculus sardous, *Crantz.*
Foothills south of Kopriva, on stony slope, in flower and fruit, 15-5-17, *Turrill*, 240.
Distr. Eur., N. Afr., Orient.
Balkans: Greece, Alb., Mtn., Bulg.

Nigella damascena, *L.*
Struma Plain and Krusa Balkan, blue flowers, 4 & 5-18, *Harris*, 45, 210; foothills between Turica and Kopriva, in flower, 2-5-17, growing on banks under bushes of *Paliurus*, *Rosa*, *Rubus*, etc., *Turrill*, 138; seeds collected near Turica, 9-6-17, flowered at Kew, 5-7-18, flowers intensely blue, *Turrill* (seed number), 43.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

Nigella arvensis, *L.*
Krusa Balkan, in flower and fruit, 6-18, *Harris*, 404; foothills to south of Turica, pale blue flowers, 27-5-17, *Turrill*, 334; near Snevce, in flower and fruit, 24-7-17, *Turrill*, 535.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Alb., Mtn., Serb., Bulg.

Nigella elata, *Boiss.*
Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 64; hills to south-west of Turica, in flower and young fruit, 8-6-17, *Turrill*, 404.
Distr. Previously only recorded from Asia Minor.

Helleborus cyclophyllus, *A. Br.*
Struma Plain and Krusa Balkan, in fruit, 4 & 5-18, *Harris*, 109.
Distr. Greece, Maced., Alb.

Delphinium paniculatum, *Host.*
Struma Plain and Krusa Balkan, in flower, 4 to 6-18, *Harris*, 17, 207, 414; Jenikŏj (Yenikoy) and "Deep Cut Ravine," near water-side, in flower, 18-6-17, *Baker*, 7; field near Turica, in flower, 6-5-17, *Turrill*, 183.
Distr. Eur., Orient.
Balkans: General excl. Greece.

Delphinium orientale, *J. Gay.*
Krusa Balkan, in flower and fruit, 6-18, *Harris*, 352, 371; Paprat District, Krusa Balkan, in flower and fruit, 6-18, *Russell*, 31.
Distr. S.-E. Eur., Orient.
Balkans: Greece, Serb., Bulg.

Delphinium halteratum, *S. et S.*
Krusa Balkan, in flower, 6-18, *Harris*, 366; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 65; Kilindir, in flower, 11-6-17, *Baker*, 8; south slopes of Krusa Balkan, near Karamudli, 29-6-17, *Turrill*, 448.
Distr. Epirus, Thessaly, Maced., Serb., Bulg., Thrace.

Paeonia peregrina, *Mill.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 312.
Distr. Maced., Mtn., Serb., Roumania, Bulg., Thrace, W. Asia Minor.
Not previously recorded south of the Rupel Pass in Macedonia.

BERBERIDACEAE.

Leontice Leontopetalum, *L.*
8-10 km. north of Salonika, 11-3-17, *Turrill.*
Distr. S.E. Eur., Orient.
Balkans: Greece, Maced.

PAPAVERACEAE.

Papaver Rhoeas, *L.*
Struma Plain and Krusa Balkan, 4 & 5-18, a form with much dissected leaves with acute segments, *Harris*, 77; field near Turica, in flower, 18-5-17, *Turrill*, 265; seeds collected near Turica, 6-5-17, flowered at Kew, 15-6-18, *Turrill* (seed-number), 3.
Distr. Eur., N. Afr., Orient.
Balkans: General.

Papaver strigosum, *Schur.*
Near Turica, in flower and fruit, 18-5-17, *Turrill*, 267; seeds collected near Turica, 6-5-17, flowered at Kew 15-6-18, *Turrill* (seed-number), 4.
Distr. Eur., N. Afr., Orient.
Balkans: Greece.

Papaver hybridum, *L.*
On a dry bank near Turica, in fruit, 24-5-17, *Turrill*, 308a.
Distr. W. and S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Serb., Bulg., Thrace.

Glaucium corniculatum, *Curt.*
Struma Plain and Krusa Balkan, in flower and fruit, 5-18, *Harris*, 206. It is not possible to be certain from the dried specimen whether this plant had scarlet or yellow flowers, possibly it had the latter, when it would be the variety *flaviflorum*, DC.

Glaucium corniculatum, *Curt.*, var. **phoeniceum**, *DC.* (*G. phoeniceum*, Crantz).
Struma Plain, about 2 km. east of Orljak, bright scarlet flowers, 26-4-17, *Turrill*, 102; seeds collected near Turica, 9-6-17, flowered at Kew, 25-6-18, scarlet flowers, *Turrill* (seed number) 44.
Distr. (of sp. and var.) Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Roemeria hybrida, *DC.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 80; Struma Plain, about 2 km. south-east of Orljak, blue flowers, 26-4-17, *Turrill*, 104.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced.
Fedde in Engler, Pflanzr. Papav., p. 241 (1909), says the most northern example of this species hitherto recorded came from Salonika. Velenovsky does not record it from Bulgaria.

Hypecoum grandiflorum, *Benth.*
Struma Plain and Krusa Balkan, in flower and fruit, 5-18, *Harris*, 218; near Gumus Dere, in flower, 4-18, *Russell*, 1; 8-10 km. north of Saloniki, in flower and fruit, 13-4-17, *Turrill*, 54; seeds collected near Turica, 12-5-17, flowered at Kew, 1-6-18, *Turrill* (seed-number), 21.
Distr. S. Eur.
Balkans: Greece, Serb., Bulg.

FUMARIACEAE.

Corydalis Marschalliana, *Pers.*
Near Gumus Dere, in flower, 5-18, *Russell*, 9.
Distr. S.E. Eur., Asia Minor.
Balkans: Maced., Serb., Bulg., Thrace.

Fumaria officinalis, *L.*
Struma Plain and Krusa Balkan, in flower and fruit, 4 & 5-18, *Harris*, 85.
Distr. Eur., N. Afr., Orient, Temp. Asia.
Balkans: General.

CRUCIFERAE.

Rapistrum Linneanum, *Boiss. et Reut.*
Between Turica and Kopriva, in flower and fruit, 25-5-17, *Turrill*, 312.
Distr. S. Eur., N. Afr.
Balkans: Greece.

Cardamine graeca, *L.*
Near Gumus Dere, in flower, 4-18, *Russell*, 11.
Distr. S.-E. Eur., Orient.
Balkans: General.

Erysimum repandum, *L.*
8-10 km. north of Salonika, in flower and fruit, 13-4-17, *Turrill*, 44.
Distr. E. Eur., N. Afr., Orient.
Balkans: General.

Erysimum atticum, *Heldr. et Sart.*
Southern slopes of Krusa Balkan, south-east of Karamudli, yellow flowers and young fruits, 20-6-17, *Turrill*, 425.
Distr. Greece.

Sisymbrium Sophia, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 82; weed in cultivated ground near Turica, in fruit, 14-5-17, *Turrill*, 209.
Distr. Eur., N. Afr., Orient, Cent. Asia.
Balkans: General.

Sisymbrium orientale, *L.*
Weed in cultivated ground near Turica, long pods, 14-5-17, *Turrill*, 208.
Distr. Cent. and S. Eur., Orient.
Balkans: General.

Eruca sativa, *Lam.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 293.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Bulg., Thrace.

Berteroa incana, *DC.*
Southern slopes of Krusa Balkan, south-east of Karamudli, in flower and fruit, 20-6-17, *Turrill*, 430.
Distr. N. and Cent. Eur., Orient, N. Asia.
Balkans: Maced., Bulg.

Erophila verna, *Meyer.*
Abundant in February on the hills to the north of Salonika, *Turrill.*
Distr. Eur.
Balkans: General.

Alyssum desertorum, *Stapf.*
Struma Plain and Krusa Balkan, in flower and fruit, 4 & 5-18; *Harris*, 132; near Turica, small yellow flowers and glabrous fruits, 7-5-17, *Turrill*, 184; seeds collected near Turica, 7-5-17, flowered at Kew, 5-6-18, *Turrill* (seed-number), 7.
Distr. S.E. Eur., Orient, N. Asia.
Balkans: General.

Alyssum micranthum, *M. B.*
Struma Plain and Krusa Balkan, in flower and fruit, 4 & 5-18, *Harris*, 51: 8-10 km. north of Salonika, small yellow flowers and hairy fruits, 13-4-17, *Turrill*, 32; near Turica, 7-5-17, *Turrill*, 185; seeds collected near Turica, 7-5-17, flowered at Kew, 5-6-18, *Turrill* (seed-number), 6.
Distr. S.E. Eur., Orient.
Balkans: Serb., Bulg., Thrace.

Alyssum murale, *W. K.*
South-east of Karamudli, yellow flowers, 20-7-17, *Turrill*, 429.
Distr. S.-E. Eur., Orient.
Balkans: General.

Camelina sativa, *Cr.*
Struma Plain, about 2 km. east of Orljak, in flower and fruit, 26-4-17, *Turrill*, 101.
Distr. Eur., Orient.
Balkans: Bulg.

Lepidium latifolium, *L.*
Between Kasimli and Snevce, in flower, 1-7-17, *Turrill*, 459.
Distr. Cent. and S. Eur., N. Afr., Orient, N. Asia.
Balkans: Greece, Bulg., Thrace.

Lepidium ruderale, *L.*
Near Alexsia, in flower and fruit, 24-7-17, *Turrill*, 528.
Distr. Eur., Orient, N. Asia.
Balkans: General.

RESEDACEAE.

Reseda Luteola, *L.*
Struma Plain and Krusa Balkan, in flower and fruit, 5 & 6-18, *Harris,* 183, 337.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Serb., Bulg., Thrace.

CISTACEAE.

Cistus villosus, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris,* 32; hill slopes south-west of Turica, red flowers, 5-5-17, *Turrill,* 155.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Mtn., Thrace.
Shrub to 2 ft. in height.

Helianthemum salicifolium, *Pers.*
About 3 km. north-east of Orljak, in flower and fruit, 20-4-17, *Turrill,* 82; foothills between Turica and Kopriva, in flower and fruit, 30-4-17, *Turrill,* 127; seeds collected between Turica and Kopriva, 7-5-17, flowered at Kew, 15-6-18, *Turrill* (seed-number), 11; seeds collected near Jeniköj, 22-4-17, flowered at Kew, 5-7-18, *Turrill* (seed-number), 75.
Distr. Cent and S. Eur., N. Afr., Orient.
Balkans: General.
The flowers open early in the day and the petals fall about noon.

Helianthemum guttatum, *L.*, var. **plantagineum,** *Gren. et Godr.*
Hill slopes south-west of Turica, in flower, 5-5-17, *Turrill,* 161.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Alb.

VIOLACEAE.

Viola odorata, *L.*
Near Gumus Dere, in flower, 4-18, *Russell,* 12.
Distr. Eur., N. Afr., Orient, Cent. Asia.
Balkans: General.

Viola Kitaibeliana, *R. et S.*
Struma Plain and Krusa Balkan, in fruit, 4 & 5-18, *Harris,* 55.
Distr. Cent. and S.-E. Eur., N. Afr.
Balkans: General.

Viola tricolor, *L.*
Krusa Balkan, in flower, 6-18, *Harris,* 411.
Distr. Eur., Orient, Temp. Asia.
Balkans: General.

POLYGALACEAE.

Polygala monspeliaca, *L.*
Between Turica and Kopriva, in flower, 7-5-17, *Turrill,* 181.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Mtn.

Agrostemma Githago, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris,* 106.
Distr. Eur., N. Afr., Orient.
Balkans: General.

Agrostemma Coronaria, *L.*
Paprat District, Krusa Balkan, in flower, 6-18, *Russell,* 50; south-east of Karamudli, southern slopes of Krusa Balkan, bright magenta flowers, 20-6-17, *Turrill,* 423.
Distr. S. Eur., Orient, Himalayas.
Balkans: General.

Viscaria atropurpurea, *Griseb.*
Struma Plain and Krusa Balkan, in flower, 6-18, *Harris,* 305; Paprat District, Krusa Balkan, in flower, 6-18, *Russell,* 92.
Distr. Maced., Bulg., Thrace.

Melandryum sylvestre, *Roehl.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris,* 321.
Distr. Eur.
Balkans: Bulg.

Silene venosa, *Aschers.* var. **commutata,** *Gürke.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris,* 81: Paprat District, Krusa Balkan, in fruit, 6-18, *Russell,* 70.
Distr. (of var.) S.-E. Eur., Orient.
Balkans: Greece, Maced.

Silene conica, *L.*
Seeds collected at Kopriva, 15-5-17, flowered at Kew, 4-6-18, *Turrill* (seed-number), 24.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Silene subconica, *Friv.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris,* 43, 78, 124, 265; hill-slopes south-west of Turica, pink corollas, inflated fruiting calyces, 5-5-17, *Turrill,* 153.
Distr. Maced., Serb., Bulg., Thrace.

Silene Harrisii, *Turrill,* species nova affinis *S. coniflorae,* Otth., sed calyce longe et patule hirsuto, dentibus longioribus facile distinguenda.
Planta annua, erecta, usque ad 2·8 dm. alta, caulibus teretibus dense puberulis. *Folia* basilaria lineari-spathulata, apice acuta, in petiolum gradatim angustata, 2-3 cm. longa, 3·5—4·5 mm. lata, costa media conspicua, nervis lateralibus indistinctissimis, caulina lineari-lanceolata, apice acute attenuata, 2-4 cm. longa, usque ad 3 mm. lata, utrinque puberula, quinquenervia, sessilia. *Inflorescentia* 4-8-floris. *Calyx* cylindrico-conicus, 1·5 cm. longus, 4 mm. diametro, dentibus 5 acutissimis

8 mm. longis, hirtis albis patulis 2-3 mm. longis instructus, 20-nervis. *Corolla* rosea, petalis 1·8 cm. longis, limbo obcordato basi angustato 5 mm. longo, 2·5 mm. lato, ungue alato apice cum dentibus lateralibus duobus 1·5 mm. longis instructo. *Stamina* 5, antheris 1·5 mm. longis, filamentis 1·25 cm. longis. *Ovarium* conico-cylindricum, 2·75 mm. altum, 1·5 mm. diametro; stigmata 4·5 mm. longa.

Struma Plain, in flower, 4 & 5-18, *Harris*, 164; Struma Plain about 2 km. east of Orljak, pink flowers, 26-4-17, *Turrill*, 103.

Silene gallica, *L.*

8-10 km. north of Salonika, small pink flowers, 13-4-17, *Turrill*, 50.

Distr. Cent. and S. Eur., N. Afr., Orient.

Balkans: Greece, Mtn., Serb.

Silene trinervia, *Seb. et Maur.*

Struma Plain and Krusa Balkan, in flower, 6-18, *Harris*, 340; between Kurkut and Alexsia, pink flowers, 15-6-17, *Turrill*, 414.

Distr. S.-E. Eur.

Balkans: General.

Silene Roemeri, *Friv.*

West of Karamudli, near the dried-up bed of a branch of the R. Spanc, cream flowers, long inflorescences, 16-7-17, *Turrill*, 511.

Distr. Maced., Alb., Serb., Bulg.

Silene italica, *Pers.*

Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 46, 310.

Distr. S. Eur., N. Afr., Orient.

Balkans: General.

Silene Skorpili, *Vel.*

Krusa Balkan, in flower, 6-18, *Harris*, 374; Akbunar, about 8 km. north-west of Salonika, in flower, 8-17, *Turrill*, 546.

Distr. Bulg., Thrace.

The upper part of the stem and the calyces are very viscous.

Saponaria officinalis, *L.*

Between Kasimli and Snevce, white flowers with very sweet scent, 1-7-17, *Turrill*, 463.

Distr. Eur., Orient, Cent. Asia.

Balkans: General.

Saponaria Vaccaria, var. **grandiflora,** *Fisch.*

Struma Plain and Krusa Balkan, in flower, 5-6-18, *Harris*, 212, 407.

Distr. Cent. and S. Eur., Orient, Temp. Asia.

Balkans: Greece and probably General.

Gypsophila muralis, *L.*
Near Trinity Well, south-west of Turica, pink flowers, 7-5-17, *Turrill*, 400.
Distr. Eur., Orient, Cent. Asia.
Balkans: Thessaly, Maced., Serb., Bulg.

Tunica Saxifraga, *Scop.*
Hills between Turica and Gumus Dere, pinkish flowers, 5-6-17, *Turrill*, 381.
Distr. Cent. and S. Eur., Orient.
Balkans: General.

Tunica illyrica, *Boiss.*
Southern slopes of Krusa Balkan, near Karamudli, white flowers, 29-6-17, *Turrill*, 445; north of Karamudli, white flowers, 8-7-17, *Turrill*, 479.
Distr. S.-E. Eur.
Balkans: General.
In 445 the calyx, in marked contrast with the glandular stems and peduncles, is quite glabrous; in 479 it is more or less roughly hirsute.

Dianthus Frivaldskyanus, *Boiss.*
Akbunar, about 8 km. north-west of Salonika, 10-18, *Turrill*, 547.
Distr. Maced., Bulg., Thrace.

Dianthus tenuiflorus, *Griseb.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 199, 215, 268; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 79; Uladaja and Kilindir, generally among rocks, in flower, 12-6-17, *Baker*, 6; hills between Turica and Gumus Dere, flowers deep to pale pink, 25-5-17, *Turrill*, 320.
Distr. Maced., Serb., Bulg., Thrace.
This pink is abundant in Eastern Macedonia and shows a considerable amount of variation in the size and colour of the flowers and in the amount of the indumentum. The size of the flowers, as Dr. Stapf kindly pointed out to the writer, in many species of Dianthus is correlated with sexual variations. An examination of examples of *D. tenuiflorus* showed this to be the case in this species. Thus *Harris*, 268, *Russell*, 79, and *Turrill*, 320, have flowers up to 2 cm. in length, possessing well-developed stamens, with large anthers and styles, and in every way typically hermaphrodite. On the other hand, *Harris*, 199 and 215, have flowers about 1·7 cm. long and the stamens are more or less abortive, the plant being functionally female.

Dianthus ambiguus, *Panč.*
Uladaja Ravine, on hillside, in flower, 12-6-17, *Baker*, 19.
Distr. Balkans, from Macedonia northwards.

Dianthus leptopetalus, *Willd.*
Foothills near Turica, white flowers, 9-6-17, *Turrill*, 406.
Distr. Maced., Thrace, S. Russia, Caucasus, Songaria.

Dianthus quadrangulus, *Vel.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris,* 198; Paprat District, Krusa Balkan, in flower, 6-18, *Russell,* 63; Struma Plain, between Kopriva and Lake Butkova, coll. Staff-Serg. Firth, 1-5-17, *Turrill,* 135; hills between Turica and Gumus Dere, dark-red flowers in heads, 25-5-17, *Turrill,* 319.
Distr. Maced., Bulg., Thrace.

Kohlrauschia prolifera, *Rchb. f.*
Foothills near Turica, in flower and fruit, 24-5-17, *Turrill,* 298; seed collected on southern slopes of Krusa Balkan, west of Karamudli, 30-6-17, flowered at Kew, 15-6-18, *Turrill* (seed-number), 66.
Distr. Eur., Orient.
Balkans: General.

Kohlrauschia velutina, *Rchb. f.*
Struma Plain and Krusa Balkan, 4 & 5-18, *Harris,* 12; between Kopriva and Turica, in flower, 1-5-17, *Turrill,* 134; foothills near Turica, 24-5-17, *Turrill,* 299.
Distr. S.-E. Eur., N. Afr., Orient.
Balkans: Maced., Greece.

Velezia rigida, *L.*
On dry banks near Turica, small pink flowers, 24-5-17, *Turrill,* 306.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Bulg.

Moenchia mantica, *Brtl.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris,* 127, 238; 8-10 km. north of Salonika, in flower, 13-4-17, *Turrill,* 17.
Distr. Cent. and S. Eur., Orient.
Balkans: General.
Velenovsky's subspecies *bulgarica* does not appear to be anything more than a form of this plant.

Arenaria leptoclados, *Guss.*, var. **viscidula,** *Rouy et Fouc.*
Struma Plain, between Kopriva and Kopriva Bridge, in flower and fruit, 26-5-17, *Turrill,* 323.
Distr. Eur., N. Afr., Orient.
Balkans: Greece.

Alsine setacea, *W. K.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris,* 307; 8-10 km. north of Saloniki, 13-4-17, *Turrill,* 15.
Distr. Cent. and S.-E. Eur.
Balkans: General.

Alsine glomerata, *Fnzl.*
Foothills south of Turica, 27-5-17, *Turrill,* 340.
Distr. S.-E. Eur.
Balkans: Maced., Serb., Bulg., Thrace.

Spergula pentandra, *L.*
Struma Plain and Krusa Balkan, in flower and fruit, 4 & 5-18, *Harris*, 128.
Distr. Eur., N. Afr., Orient.
Balkans: Maced., Greece.

Spergularia rubra, *Wahl.*
Gumus Dere, pink flowers, 7-6-17, *Turrill*, 385.
Distr. Eur., Orient, Cent. Asia.
Balkans: General.

LINACEAE.

Linum gallicum, *L.*
Hills between Turica and Gumus Dere, small yellow flowers, 5-6-17, *Turrill*, 380.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Bulg.

Linum flavum, *L.*, var. **thracicum,** *Griseb.*
Struma Plain and Krusa Balkan, yellow flowers, 4 to 6-18, *Harris*, 17, 95, 96, 276, 403; foothills between Orljak and Turica, a low shrub with yellow flowers, 29-4-17, *Turrill*, 114.
Distr. (of var.) Maced., Bulg., Thrace.

Linum angustifolium, *Huds.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 309.
Distr. W. and S. Eur., Orient.
Balkans: Greece, Maced., Mtn., Bulg., Thrace.

Linum tenuifolium, *L.*
Struma Plain and Krusa Balkan, 4 & 5-18, *Harris*, 103, 110, 248, 320; foothills south-west of Turica, petals white with blue veins at base, 27-5-17, *Turrill*, 342.
Distr. Cent. and S. Eur., Orient.
Balkans: General.

Linum usitatissimum, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 245.
Distr. Introduced into many countries.
Balkans: Greece.

MALVACEAE.

Althaea officinalis, *L.*
Krusa Balkan, in flower, 6-18, *Harris*, 384; near Alexsia, in flower, 24-7-17, *Turrill*, 524.
Distr. Cent. and S. Eur., Orient.
Balkans: Greece, Maced., Alb., Mtn., Bulg.

Althaea pallida, *W. K.*
Krusa Balkan, in flower and fruit, 6-18, *Harris*, 375.
Distr. S.-E Eur., Orient.
Balkans: General.

Lavatera thuringiaca, *L.*
Southern slopes of Krusa Balkan, west of Karamudli, in flower, 21-6-17, *Turrill*, 434.
Distr. Cent. and S.-E. Eur., Orient, Cent. Asia.
Balkans: General (rare in Greece).
Our plant is the *Lavatera ambigua* of De Candolle, originally described (in DC. Prodr., I., p. 440) from Neapolitan specimens and differing from the typical plant in the more acute lobes of the upper leaves, with the middle lobe twice the length of the lateral ones. The dentation is more prominent, with the teeth more acute. This form, scarcely worth even varietal rank, has also been recorded from Greece (Hal., Consp. Fl. Gr., I., p. 267).

Lavatera punctata, *All.*
Foothills between Turica and Kopriva, fine pink flowers, 29-5-17, *Turrill*, 352.
Distr. S. Eur., Orient.
Balkans: Greece, Maced., Serb.

Lavatera trimestris, *L.*
Uladaja Ravine, near water-side, in flower, 11-6-17, *Baker*, 18; western end of Krusa Balkan, overlooking Lake Doiran, large pink flowers, 1-7-17, *Turrill*, 467.
Distr. S. Eur., Orient.
Balkans: Greece.

Malva silvestris, *L.*
Abundant in waste places about Turica and Kopriva, in flower and fruit, 29-5-17, *Turrill*, 351.
Distr. Eur., N. Afr., Orient, Cent. Asia.
Balkans: General.

Malva rotundifolia, *L.*
Struma Plain and Krusa Balkan, in flower and fruit, 4-5-18, *Harris*, 93.
Distr. Eur., Orient.
Balkans: General.

TILIACEAE.

Tilia argentea, *Desf.*
Nullah to south of Turica, 6-5-17, *Turrill*, 168.
Distr. S.-E Eur., Bithynia.
Balkans: General.

HYPERICACEAE.

Hypericum olympicum, *L.*
Struma Plain and Krusa Balkan, in flower, 5 & 6-18, *Harris*, 197, 398; hills between Turica and Gumus Dere, large yellow flowers, 5-6-17, *Turrill*, 379; between Kasimli and Snevce, flowers and young fruits, 1-7-17, *Turrill*, 465.
Distr. Greece, Maced., Bulg., Thrace, Asia Minor.

Hypericum perforatum, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 149; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 85; foothills between Turica and Kopriva, in flower, 2-6-17, *Turrill*, 360; south of Karamudli, in flower, 15-7-17, *Turrill*, 495.
Distr. Eur., Orient, Cent. Asia.
Balkans: General.

Hypericum Montbretii, *Spach.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 150.
Distr. Maced., Bulg., Asia Minor.

Hypericum rumelicum, *Boiss.*
Gugunci and "Buc-hill," in flower, 8-5-17, *Baker*, 24.
Distr. Maced., Serb.

ACERACEAE.

Acer campestre, *L.*
On the hills south-west of Kopriva, in fruit, 15-5-17, *Turrill*.
Distr. Cent. and S. Eur., Orient.
Balkans: Greece, Maced.; Serb., Bulg.

GERANIACEAE.

Geranium sanguineum, *L.*
Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 52; hills west by south of Kopriva, large, brightly-coloured flowers, under bushes, 15-5-17, *Turrill*, 227.
Distr. Eur. (excl. north), Orient.
Balkans: General.

Geranium rotundifolium, *L.*
Near Trinity Well, south-west of Turica, in flower and fruit, 7-5-17, *Turrill*, 402.
Distr. Eur., N. Afr., Orient, Cent. Asia.
Balkans: General.

Geranium columbinum, *L.*
Paprat District, Krusa Balkan, in flower and fruit, 6-18, *Russell*, 59; seed collected near Turica, 22-5-17, flowered at Kew, 6-6-18, *Turrill* (seed-number), 13.
Distr. Eur., Orient, Temp. Asia.
Balkans: General.

Geranium dissectum, *L.*
Seeds collected between Turica and Kopriva, 9-5-17, flowered at Kew, 6-6-18, *Turrill* (seed-number), 27.
Distr. Eur., N. Afr., Orient, Temp. Asia.
Balkans: General.

Geranium molle, *L.*
Struma Plain and Krusa Balkan, in flower and fruit, 4 & 5-18, *Harris*, 129.
Distr. Eur., N. Afr., Orient.
Balkans: General.

Geranium lucidum, *L.*
Struma Plain and Krusa Balkan, in flower and fruit, 5-18, *Harris*, 214; foothills between Turica and Kopriva, in flower and fruit, 30-4-17, *Turrill*, 121.
Distr. Cent. and S. Eur., N. Afr., Orient, Cent. Asia.
Balkans: Greece, Maced., Mtn., Serb., Bulg., Thrace.

Erodium cicutarium, *L'Her.*
Struma Plain and Krusa Balkan, in flower and fruit, 5-18, *Harris*, 168, 183.
Distr. Eur., N. Afr., Orient, Temp. Asia.
Balkans: General.
The flowers open in the early morning and the petals fall after noon.

ZYGOPHYLLACEAE.

Tribulus terrestris, *L.*
Krusa Balkan, in flower and fruit, 6-18, *Harris*, 365; just south of Karamudli, in flower and fruit, 23-7-17, *Turrill*, 523.
Distr. S. Eur., N. and S. Afr., Orient.
Balkans: Greece, Maced., Serb., Bulg., Thrace.
Prostrate, spreading branches, pale yellow corollas.

RUTACEAE.

Dictamnus albus, *L.*
Struma Plain and Krusa Balkan, in flower, 5 & 6-18, *Harris*, 205, 406.
Distr. Eur., Orient, Temp. Asia.
Balkans: General.

Peganum Harmala, *L.*
Struma Plain and Krusa Balkan, in flower, 6-18, *Harris*, 327.
Distr. S. Eur., N. Afr., Orient, Temp. Asia.
Balkans: General.

RHAMNACEAE.

Paliurus Spina-Christi, *Mill.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 163; found generally around Gugunci, Doiran, and Kilindir, in flower, 1-5-17, *Baker*, 5; Struma Plain, about 3 km. east of Orljak, foliage and old fruit, 20-4-17, *Turrill*, 78; foothills between Turica and Kopriva, in flower, 17-5-17, *Turrill*, 257.
Distr. Eur., Orient.
Balkans: General.
The yellowish-green flowers attract a great many flies and ladybirds, which hang on the inflorescences and walk over the flowers.

ANACARDIACEAE.

Pistacia Terebinthus, *L.*
Hills west by south of Kopriva, in young fruit, 15-5-17, *Turrill*, 229.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

Rhus Cotinus, *L.*
Struma Plain and Krusa Balkan, 4 & 5-18, *Harris*, 8, 27; Krusa Balkan, in flower, 6-18, *Harris*, 409; hillsides, Gumus Dere, in flower, 19-5-17, *Turrill*, 274.
Distr. S. Eur., Orient.
Balkans: General.
The conspicuously red-haired pedicels make this a prominent shrub.

LEGUMINOSAE.

Genista ovata, *W.K.*
Western end of Krusa Balkan, overlooking Lake Doiran, yellow flowers, 2-7-17, *Turrill*, 470.
Distr. S.-E. Eur.
Balkans: General.

Genista depressa, *M.B.*
Struma Plain and Krusa Balkan, in flower, 4 to 6-18, *Harris*, 6, 308, 406; hills between Turica and Gumus Dere, yellow flowers, 25-5-17, *Turrill*, 316.
Distr. Bulg., Thrace, Asia Minor.

Cytisus hirsutus, *L.*
6 km. north-east of Lahana, in flower, 19-4-17, *Turrill*, 72.
Distr. Cent. and S.-E. Eur., Bithynia.
Balkans: General.

Cytisus austriacus, *L.*
Near Karamudli, yellow flowers, 23-6-17, *Turrill*, 436.
Distr. Cent. and S.-E. Eur.
Balkans: General.

Lupinus angustifolius, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 13, 226; near Gumus Dere, in flower, 5-18, *Russell*, 4; Struma Plain, about 3 km. east of Orljak, blue flowers, 20-4-17, *Turrill*, 89.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece.

Ononis antiquorum, *L.*
Krusa Balkan, in flower, 6-18; *Harris*, 373; southern slopes of Krusa Balkan, in flower, 12-7-17, *Turrill*, 487.
Distr. S.-E. Eur., Orient.
Balkans: Greece, Maced.

Ononis spinosa, *L.*
Seed probably collected south of Lake Doiran, flowered at Kew, 20-9-18, *Baker* (seed-number), 4.
Distr. Eur., Orient, Temp. Asia.
Balkans: General.

Medicago falcata, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, a hirsute form, *Harris*, 94; Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 176, 397; between Turica and Kopriva, yellow flowers, 4-6-17, *Turrill*, 373.
Distr. Eur., Orient, Cent. Asia.
Balkans: General.

Medicago sativa, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 121; east of Karamudli, blue flowers, 9-7-17, *Turrill*, 482.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece, Serb., Bulg.

Medicago orbicularis, *All.*
Seeds collected near Turica, 28-5-17, flowered at Kew, 21-6-18, *Turrill* (seed-number), 15.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Mtn., Serb., Bulg., Thrace.
Two fruits sometimes twine together.

Medicago disciformis, DC.
8-10 km. north of Salonika, in flower and fruit, 13-4-17, *Turrill*, 29.
Distr. S. Eur., Asia Minor.
Balkans: Greece, Maced.

Medicago rigidula, *Desr.*
Struma Plain and Krusa Balkan, in flower and fruit, 5-18, *Harris*, 298; 8-10 km. north of Salonika, yellow flowers, hairy spinous fruits, 13-4-17, *Turrill*, 42; seeds collected near Turica, 22-5-17, flowered at Kew, 15-6-18, *Turrill* (seed-number), 29.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

Medicago minima, *Grufberg.*
Grown from seed collected near Turica, 22-5-17, flowered at Kew, 12-6-18, *Turrill* (seed-number), 12.
Distr. Eur., N. Afr., Orient.
Balkans: General.

Medicago minima, *Grufberg*, var. **mollissima,** *Koch.*
Struma Plain, about 3 km. east of Orljak, *Turrill*, 83.
Distr. As species.

Medicago maculata, *Willd.*
Foothills between Orljak and Turica, 29-4-17, *Turrill*, 116.
Distr. Cent. and S. Eur., Orient.
Balkans: General.

Medicago lupulina, *L.*
Near Alexsia, small yellow flowers, 24-7-17, *Turrill*, 525.
Distr. Eur., N. Afr., Asia.
Balkans: General.

Melilotus sulcata, *Desf.*
8-10 km. north of Salonika, bright yellow flowers, 13-4-17, *Turrill*, 37.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece.

Melilotus alba, *Desr.*
Near River Spanc, south of Snevce, small white flowers, 24-7-17, *Turrill*, 532.
Distr. S. Eur., Orient, Temp. Asia.
Balkans: Greece, Maced., Serb., Bulg.

Melilotus indica, *All.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 146.
Distr. Spontaneous in most temperate and sub-tropical regions.

Trifolium medium, *L.*, var. **pseudomedium,** *Vel.* (*T. medium*, L., subsp. *balcanicum*, Vel.)
Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 20.
Distr. (of var.) Greece, Serb., Bulg.

Trifolium pratense, *L.*
Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 51; near Snevce, deep red flowers, 24-7-17, *Turrill*, 537.
Distr. Eur., N. Afr., Orient, Temp. Asia.
Balkans: General.

Trifolium ochroleucum, *Huds.*
Struma Plain, about 2 km. east of Orljak, whitish flowers, 28-4-17, *Turrill*, 110.
Distr. Cent. and S. Eur., Orient.
Balkans: General.

Trifolium ochroleucum, *Huds.*, var. **roseum,** *Presl.*
South-east of Karamudli, in flower, 20-6-17, *Turrill*, 424.
Distr. Cent. and S. Eur., Orient.
Balkans: General.

Trifolium Cherleri, *L.*
Struma Pain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 113; seed collected on southern slopes of Krusa Balkan, near Karamudli, 17-6-17, flowered at Kew, 25-6-18, *Turrill* (seed-number), 51.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Alb., Mtn., Herz., Thrace.
The fruiting heads of this species, with their long, hairy, persistent calyces, fall off entire and sticking together form quite large matted masses on some of the stony hill-slopes.

Trifolium hirtum, *All.*
Between Turica and Kopriva, red flowers, 5-5-17, a very hairy plant, *Turrill*, 150.
Distr. S. Eur., Orient.
Balkans: General.

Trifolium Lagopus, *Pourr.*
Hill-slopes south-west of Turica, pinkish flowers, 5-5-17, *Turrill*, 154.
Distr. S. Eur., Orient.
Balkans: Serb., Bulg., Thrace.

Trifolium stellatum, *L.*
Near Turica, in fruit, 5-18, *Turrill.*
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Mtn., Thrace.

Trifolium arvense, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 59; seeds collected on the southern slopes of the Krusa Balkan, near Karamudli, 29-6-17, flowered at Kew, 25-6-18, *Turrill* (seed-number), 61; Struma Plain, about 3 km. east of Orljak, in flower, 20-4-17, a form with long leaflets and cylindrical heads, *Turrill*, 76; hills west by south of Kopriva, in flower, 15-5-17, a very slender form, *Turrill*, 235; dry southern slopes of the Krusa Balkan, near Karamudli, in flower, 24-7-17, a stunted form of which the upper shoots were apparently eaten or cut off, and the lower parts then became semi-woody and gave rise to fresh branches, *Turrill*, 543.
Distr. Eur., N. Afr., Orient, Temp. Asia.
Balkans: General.

Trifolium tenuifolium, *Ten.*
Dry southern slopes of Krusa Balkan, near Karamudli, narrow leaflets, white flowers, 24-7-17, *Turrill*, 542.
Distr. S.-E. Eur.
Balkans: Greece, Maced., Alb.

Trifolium angustifolium, *L.*
Paprat District, Krusa Balkan, in fruit, 6-18, *Russell*, 55.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

Trifolium purpureum, *Lois.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 155; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 60; between Turica and Kopriva, large heads with red flowers, 17-5-17, *Turrill*, 252.
Distr. S. France, Italy, Balkans, Orient.
Balkans: General.

Trifolium striatum, *L.*
Between Turica and Kopriva, white flowers, 21-5-17, *Turrill*, 285; seeds collected south of Karamudli, 29-6-17, flowered at Kew, 5-7-18, *Turrill* (seed-number), 63.
Distr. Cent. and S. Eur., Orient.
Balkans: General.

Trifolium scabrum, *L.*
Foothills near Turica, small whitish corollas, large green calyces, 7-5-17, *Turrill*, 186.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Trifolium subterraneum, *L.*

Foothills near Turica, flowers and fruit, 24-5-17, *Turrill*, 297.

Distr. Cent. and S. Eur., N. Afr., Orient.

Balkans: Greece, Maced., Alb., Mtn., Bulg., Thrace.

Although this species is well-known, being, indeed, a British plant, the following observations, carefully made from very fine material in the field, may not be superfluous. The stems are prostrate, up to 1 ft. in length and closely applied to the ground. The whole plant is very hairy. The flower-heads are borne singly in the axils of the leaves, every leaf having an inflorescence in its axil except the lower ones, whose buds give rise to the branches. About 4 erect flowers comprise the young inflorescence—in every inflorescence seen there were 4 perfect flowers. In the centre of each head is a terminal bud. At or immediately after fertilization the 4 flowers spread out. The corolla is inconspicuous, whitish-yellow in colour, tinged with pink. The calyces have 5 long acicular teeth bearing long, distinct hairs. Soon after fertilization the calyces become swollen and bend downwards, exposing the terminal bud which commences to develop and produces numerous sterile flowers, each of which, when fully formed, is composed of a calyx tube with 5 long, acicular, spreading, hairy teeth. These sterile calyces bend over in succession and finally closely envelop the developing fruits. Each fruit contains a single seed. Meanwhile the common peduncle has lengthened and most of the fruit-heads get pushed below the loose surface of the soil. The sterile calyces of those thus buried are white and etiolated, of those remaining above ground pale green. The sterile calyx tubes are practically solid and their teeth become hardened into stiff bristles. Eventually the entire heads become detached.

Trifolium fragiferum, *L.*

Near Snevce, side of R. Spanc, in flower and fruit, 24-7-17, *Turrill*, 539.

Distr. Eur., N. Afr., Orient.

Balkans: General.

The swollen fruiting-calyces are somewhat more hairy than in the majority of specimens of this species in Herb. Kew.

Trifolium resupinatum, *L.*

Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 114; Paprat District, Krusa Balkan, in flower and fruit, 6-18, *Russell*, 91; 8-10 km. north of Salonika, in flower, 13-4-17, *Turrill*, 47; near Kopriva, in fruit, 29-5-17, *Turrill*, 349a.

Distr. S. Eur., Orient.

Trifolium hybridum, *L.*

By the side of the R. Spanc, near Snevce, white or pink-white flowers, 24-7-17, *Turrill*, 538.

Distr. Cent. and S. Eur., Orient.

Balkans: General.

Trifolium procumbens, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 52; seeds collected near Kopriva, 22-5-17, flowered at Kew, 6-6-18; *Turrill* (seed-number), 31; near Snevce, in flower, 24-7-17, a form with smaller leaves and flowers than in the typical plants, *Turrill*, 540.
Distr. Eur., N. Afr., Orient.
Balkans: General.

Hymenocarpos circinnata, *Savi.*
8-10 km. north of Salonika, large terminal leaflets with yellow flowers, 13-4-17, *Turrill*, 16.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Thrace.

Dorycnium intermedium, *Led.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 156; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 66; foothills between Turica and Kopriva, white flowers, 17-5-17, *Turrill*, 254.
Distr. S.-E. Eur., Asia Minor.
Balkans: General.

Lotus corniculatus, *L.*, var. **pilosus,** *Jord.*
Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 32.
Distr. Eur., Temp. Asia, etc.
Balkans: General.

Lotus angustissimus, *L.*
South-east of Karamudli, yellow flowers, 6-17, *Turrill*, 421; nullahs to south of Karamudli, 29-6-17, *Turrill*, 452a.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Serb., Bulg.

Lotus aegeus, *Boiss.*
Struma Plain and Krusa Balkan, in flower, 4 to 6-18, *Harris*, 3, 211, 330; Uladaja Ravine, 2 miles south-west of Lake Doiran, very common, in flower, 12-6-17, *Baker*, 1; hill-slopes south-west of Turica, 5-5-17, *Turrill*, 157; between Turica and Kopriva, 16-5-17, *Turrill*, 246.
Distr. Thessaly, Maced., Thrace.
This is a very beautiful plant, about 1 ft. in height with large yellow flowers and grey-green stems and foliage covered with long, soft hairs.

Scorpiurus subvillosa, *L.*
8-10 km. north of Salonika, yellow flowers, 13-4-17, *Turrill*, 46.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece.

Ornithopus compressus, *L.*
8-10 km. north of Salonika, yellow flowers, 13-4-17, *Turrill*, 23; hill slopes south-west of Turica, in flower and fruit, 5-5-17, *Turrill*, 166; near Turica, in flower and fruit, 24-5-17, *Turrill*, 301.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

Coronilla emeroides, *Boiss.*
About 2 km. south-east of Orljak, Struma Plain, shrub with yellow flowers, 20-4-17, *Turrill*, 92a.
Distr. S.-E. Eur., Orient.
Balkans: General.

Coronilla varia, *L.*
3 km. south of Kocan mah, Krusa Balkan, in flower, 12-6-17, *Turrill*, 407.
Distr. Cent. and S. Eur., Orient.
Balkans: Greece, Maced., Mtn., Herz., Serb., Bulg.

Colutea arborescens, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 240; about 3 km. south-east of Orljak, Struma Plain, shrub with yellow flowers, 20-4-17, *Turrill*, 92; near Turica, flowers and fruit, 24-5-17, *Turrill*, 310.
Distr. Cent. and S. Eur., N. Afr.
Balkans: General.
The *Colutea arborescens* of Velenovsky (Fl. Bulg., 147) is, in the writer's opinion, merely a form of *C. arborescens*, L. All the characters mentioned as distinguishing these two species are independently variable, *e.g.*, the number of pairs of leaflets, the indumentum and dentition of the calyx and the presence or absence of a tooth on the wings.

Arthrolobium scorpioides, *DC.*
Struma Plain and Krusa Balkan, 5-18, *Harris*, 70; 8-10 km. north of Salonika, in flower, 13-4-17, *Turrill*, 26; foothills between Turica and Kopriva, in fruit, 4-6-17, *Turrill*, 372.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

Hippocrepis ciliata, *Willd.*
Foothills near Turica, in fruit, 24-5-17, *Turrill*, 296; seeds collected near Turica, 26-5-17, flowered at Kew, 5-7-18, *Turrill*, (seed-number), 18.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Herz.

Biserrula Pelecinus, *L.*
Struma Plain, about 2 km. south-east of Orljak, in flower, 27-4-17, *Turrill*, 109; foothills near Turica, in fruit, 24-5-17, *Turrill*, 305; seeds collected near Turica, 24-5-17, flowered at Kew, 5-7-18, *Turrill* (seed-number), 38.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece.

Galega officinalis, *L.*
Krusa Balkan, in flower, 6-18, *Harris*, 390; side of R. Spanc, south of Snevce, in flower, 17-7-17, *Turrill*, 519.
Distr. Cent. and S. Eur., Orient.
Balkans: Greece, Maced., Mtn., Serb., Bulg., Thrace.

Glycyrrhiza echinata, *L.*
Krusa Balkan, 6-18. *Harris*, 376 (in flower), 394 (in fruit).
Distr. Italy, S.-E. Eur., Orient.
Balkans: Greece, Maced., Bulg.

Astragalus chlorocarpus, *Griseb.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 157; Struma Plain and Krusa Balkan, in flower, 4 & 5-18, a form with smaller flowers and apparently white corollas, *Harris*, 158; Struma Plain, near Ormanli, coll. Staff-Sergt. Firth, 3-5-17, *Turrill*, 148; foothills near Turica, in flower, 12-5-17, *Turrill*, 201.
Distr. S.-E. Eur.
Balkans: Maced., Bulg., Thrace.

Astragalus hamosus, *L.*
Between Turica and Kopriva, white flowers, 30-4-17, *Turrill*, 123.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Mtn., Serb., Bulg., Thrace.

Astragalus sesameus, *L.*
8-10 km. north of Salonika, 13-4-17, *Turrill*, 10.
Distr. S. Eur., N. Afr.
Balkans: Greece (one specimen in Herb. Kew., not in Halácsy), Mtn.

Astragalus Sprunneri, *Boiss.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 135.
Distr. Greece, Maced., Mtn., Bulg.

Onobrychis alba, *Desv.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 159, 160.
Distr. S.-E. Eur.
Balkans: General.

Onobrychis gracilis, *Bess.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 141; foothills east of Turica, in flower and fruit, 27-5-17, *Turrill*, 338; seeds collected near Turica, 27-5-17, flowered and fruited at Kew, 25-6-18, *Turrill* (seed-number), 37.
Distr. S.-E. Eur.
Balkans: Maced., Bulg., Thrace.

Cicer arietinum, *L.*
East of Karamudli, in flower, 9-7-17, *Turrill*, 481.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece.

Pisum arvense, *L.*
Struma Plain, about 2 km. east of Orljak, in flower, 26-4-17, *Turrill*, 106; Struma Plain, coll. Staff-Sergt. Firth, in flower, 1-5-17, *Turrill*, 137.
Distr. Eur., N. Afr., Orient.
Balkans: General.
The buds have white standards, in the mature flowers the standards are pink and the wings dark-red.

Pisum elatius, *Stev.*
Struma Plain and Krusa Balkan, in flower, 5 & 6-18, *Harris*, 262, 383.
Distr. Eur., N. Afr., Orient.
Balkans: Greece and probably general.

Lathyrus Aphaca, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 161; 8-10 km. north of Salonika, in flower, 13-4-17, *Turrill*, 38.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Lathyrus Nissolia, *L.*
Struma Plain and Krusa Balkan, in flower and young fruit, 5-18, *Harris*, 304; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 18; hills west by south of Kopriva, red flowers, 15-5-17, *Turrill*, 234.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Lathyrus tuberosus, *L.*
Gugunci, near the old church, in flower, 26-6-17, *Baker*, 23.
Distr. Eur., N. Afr., Orient, Temp. Asia.
Balkan: Maced., Mtn., Serb., Bulg.

Lathyrus sphaericus, *Retz.*
Seeds collected on the hills north of Karamudli, 18-6-17, flowered at Kew, 6-6-18, *Turrill* (seed-number), 48.
Distr. Cent. and S. Eur., Transcauc.
Balkans: Greece, Bulg.

Lathyrus annuus, *L.*
Struma Plain and Krusa Balkan, 4 & 5-18, *Harris*, 88; Struma Plain, about 2 km. east of Orljak, yellow-brown flowers, 26-4-17, *Turrill*, 100; Struma Plain, between Kopriva and Kopriva Bridge, blue flowers, 26-5-17, *Turrill*, 325.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

Lathyrus Cicera, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 21; near Gumus Dere, in flower, 4-18, *Russell*, 8; 8-10 km. north of Salonika, carmine flowers, 13-4-17, *Turrill*, 40; 6 km. north-east of Lahana, small flowers, 19-4-17, *Turrill*, 56; foothills between Turica and Kopriva, in flower, 30-4-17, *Turrill*, 122.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Lathyrus sativus, *L.*
Struma Plain and Krusa Balkan, in flower and fruit, 5-18, *Harris*, 231.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

Lathyrus Ochrus, *DC.*
Kopriva, in flower, 30-4-17, *Turrill*, 131.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece.

Orobus hirsutus, *L.*
Struma Plain and Krusa Balkan, in flower, 4 to 6-18, *Harris*, 90, 196, 402; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 86; 6 km. north-east of Lahana, in flower, 19-4-17, *Turrill*, 57.
Distr. S.-E. Eur., Orient, Caucasus.
Balkans: General.

Orobus hirsutus, *L.*, var. **glabratus,** *Griseb.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 196a; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 94.
Distr. As type.

Orobus niger, *L.*
South-east of Karamudli, southern slopes of Krusa Balkan, purple flowers, 20-8-17, *Turrill*, 420.
Distr. Eur., Orient.
Balkans: General.

Orobus variegatus, *Ten.*
6 km. north-east of Lahana, hill country, in flower, 19-4-17, *Turrill*, 61.
Distr. S.-E. Eur., Asia Minor.
Balkans: General.

Orobus atropurpureus, *Desf.*
8-10 km. north of Salonika, simple racemes of purple flowers. 13-4-17, *Turrill*, 39.
Distr. S. Italy, Sicily, N. Afr.
The distribution of this plant is peculiar. It is not uncommon north of Salonika.

Vicia striata, *Bieb.*
Struma Plain, about 3 km. east of Orljak, clusters of blue-pink flowers, 20-4-17, *Turrill*, 79; about 2 km. south-east of Orljak, 27-4-17, *Turrill*, 108; Struma Plain, between Kopriva and Kopriva Bridge, in flower and fruit, 26-5-17, *Turrill*, 377; seeds collected near Turica, 9-6-17, flowered at Kew, 5-6-18, *Turrill* (seed-number), 45.
Distr. S. Eur.
Balkans: General.

Vicia peregrina, *L.*

Between Turica and Kopriva, blue and white solitary flowers, and hairy fruits, 2-5-17, *Turrill*, 139.

Distr. S. Eur., N. Afr., Orient.

Balkans: General.

Vicia grandiflora, *Scop.*

8-10 km. north of Salonika, large white flowers, 13-4-17, *Turrill*, 41; seeds collected near Mirova, 9-6-17, flowered at Kew, 5-6-18, *Turrill* (seed-number), 46.

Distr. S.-E. Eur., Orient.

Balkans: General.

Vicia grandiflora, *Scop.*, var. **sordida,** *Griseb.*

Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 294.

Distr. S.-E. Eur., Asia Minor.

Balkans: General.

Vicia grandiflora, *Scop.*, var. **sordida,** *Griseb.*, mutant **dissecta,** *Turrill.*

Seed collected near Karamudli, 26-6-17, flowered at Kew, 5-6-18, *Turrill* (seed-number), 57.

Both typical *Vicia grandiflora*, Scop., and the variety *sordida* are abundant in Macedonia. The latter is distinguished by its narrower leaflets. Both the type and the variety vary in the colour of the flowers from a lemon-yellow to white, more or less shaded and streaked with dull violet. Three forms of the species are given by Beck (in Reichb., Ic. Fl. Germ., xxii. p. 187), whose views seem most acceptable, viz.:—

α *typica*. With nearly or quite rounded leaflets.

β *sordida*. With the leaflets mostly oblong or linear-oblong.

γ *Biebersteinii*. With the leaflets narrowly linear and 10-12 times as long as broad.

Seeds of both α and β were collected in Macedonia in 1917, and plants grown from them flowered at Kew in June, 1918. The plants of the var. *sordida* had many of the leaflets variously and conspicuously incised, yet to the best of my recollection the parent plant had the leaflets quite entire.

The records of the appearance of forms with divided leaflets of *V. grandiflora* and of its ally *V. Barbazitae* indicate that this variation is uncommon and sporadic. There is no specimen showing it at Kew or the British Museum.

In Boissier's Flora Orientalis, II., 573, *V. sordida*, W.K., is considered synonymous with *V. grandiflora*, Scop., and under this latter a variety γ *dissecta* is described as follows: "Foliola foliorum inferiorum profunde incisa," and is given as having its habitat "in sylvaticis montis Mesogis Cariae supra Tralles." This is almost certainly our plant. Boissier also describes (l.c. p. 574), a variety of *V. Barbazitae*, Ten. et Guss., with divided leaflets, var. *incisa*, Boiss., "Foliola praesertim inferiora profunde et obtuse dentata. *V. Thessala*, Sprun. pl. exs. *V. incisa*, Orph. exs. non. M.B." The habitat is given as "in monte Malevo Laconiae (Orph. Fl. Gr. exs. 594!), in monte Œta Thessaliae (Sprun!) Fl. Jun." The species *V. Bar-*

bazitae is distinguished from *V. grandiflora* by its smaller corolla, with distinctly violet wings, its longer calyx-teeth, and its larger seeds which have a short hilum.

In Oesterr. Bot. Zeitschr., 1873, p. 80, Pantocsek described a species of *Vicia* with divided leaflets, naming it *V. serrata*, Pant. He distinguishes it from *V. grandiflora*, Scop., with its var. *dissecta*, Boiss., and from *V. Barbazitae*, Ten. et Guss., with its var. *incisa*, Boiss., by all the leaflets being deeply serrated, by the colour of the corrollas "vexillo . . . . sordide bruneo-flavo, basin cum tinctu coeruleo-purpurascente; alis flavis, carina flava, apice atra," and by its longer peduncle, yet he considers it intermediate between the two species. The habitat is given as "inter dumetos montis Gliva prope Trebinje (Hercegovina) Mai."

Rohlena (Sitzb. Bohm. Ges. Wiss., 1904, p. 43 (1905), reduces *V. serrata*, Pant. to a variety of *V. grandiflora*, Scop., having collected a plant in Montenegro which he believed to be the same as Pantocsek's. This last author states the corolla of his *V. serrata* to be 14 mm. in length; Rohlena says most of the corollas of his specimens are 20 mm. in length but that smaller ones occur. Ascherson and Graebner, Syn. Fl. Mit. Eur., vi., Abth. 2, p. 952, writing with specimens collected by Rohlena before them, state the corollas to be 2·5 cm. in length. It seems probable that Rohlena's examples belong to *V. grandiflora*, Scop., var. *dissecta*, Boiss., and that *V. serrata*, Pant. is a form of *V. Barbazitae*, Ten. et Guss., though probably not the var. *incisa*, Boiss., which has much longer calyx teeth.

It is evident that in this group of Vicias a tendency towards developing incised leaflets exists and sporadically reveals itself. Whether or not hybridization or external conditions can influence the appearance of the incised forms we do not know.

Vicia sativa, L., has also a sporadically appearing variety with incised leaflets, recorded from Italy, Sicily, Crimea and Caucasus. *V. sativa* γ *incisa*, Boiss., Fl. Or. ii., 574 (1872). *V. incisa*, M. Bieb., Fl. Taur.-Cauc. III., 171 (1819). *V. pimpinelloides*, Maur., Pl. Rom., 35, t. 1.

Vicia melanops, *S. et S.*

Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 108; Struma Plain, about 3 km. east of Orljak, flowers yellow and yellow-brown, 20-4-17, *Turrill*, 85.

Distr. S.-E. Eur.

Balkans: General.

Vicia sativa, *L.*

8-10 km. north of Salonika, in flower and fruit, 13-4-17, *Turrill*, 24.

Distr. Eur., N. Afr., Orient.

Balkans: General.

Vicia sativa, *L.* subsp. **notata,** *Aschers. et Graeb.*

Struma Plain and Krusa Balkan, in flower and fruit, 4 & 5-18, *Harris*, 92.

Distr. Eur., N. Afr., W. Asia.

Balkans: General.

Vicia angustifolia, *Roth.*
Struma Plain and Krusa Balkan, in flower and fruit, 5-18, *Harris*, 181, 182; seeds collected on the hills west of Karamudli, 30-6-17, flowered at Kew, 15-6-18, *Turrill* (seed-number), 67.
Distr. Eur., N. Afr., Orient.
Balkans: General.

Vicia lathyroides, *L.*
8-10 km. north of Salonika, in flower and fruit, 13-4-17, *Turrill*, 30.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece, Serb., Bulg., Thrace.

Vicia narbonensis, *L.*
Struma Plain, about 3 km. south-east of Orljak, in flower and fruit, 20-4-17, *Turrill*, 84; seeds collected near Turica, 28-5-17, flowered at Kew, 15-6-18, *Turrill* (seed-number), 14.
Distr. S. Eur. N. Afr., Orient.
Balkans: Greece, Alb., Bulg., Thrace.

Vicia serratifolia, *Jacq.*
Struma Plain, about 3 km. east of Orljak, in flower, 20-4-17, *Turrill*, 87.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

Vicia cassubica, *L.*
West of Karamudli, in fruit, 16-7-17, *Turrill*, 514.
Distr. Cent. and S. Eur., Orient.
Balkans: General.

Vicia bithynica, *L.*
Struma Plain, about 2 km. east of Orljak, blue flowers, 26-4-17, *Turrill*, 98; Struma Plain, between Kopriva and Kopriva Bridge, in flower, 26-5-17, *Turrill*, 324.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Mtn., Thrace.

Vicia tenuifolia, *Roth.*
Between Turica and Kopriva, a very fine plant, in flower, 2-5-17, *Turrill*, 142.
Distr. Eur., Orient, N. Asia.
Balkans: Greece, Maced., Serb., Bulg., Thrace.

Vicia tenuifolia, *Roth.*, var. **stenophylla,** *Boiss.*
Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 27.
Distr. (of var.) S.-E. Eur., Orient.
Balkans: As species.

Vicia villosa, *Roth.*
Seeds collected south of Karamudli, 29-6-17, flowered at Kew, 15-6-18, *Turrill* (seed-number), 64.
Distr. Cent. and S. Eur., Orient.
Balkans: General.

Ervum hirsutum, *L.*
Struma Plain and Krusa Balkan, in flower and fruit, 4 & 5-18, *Harris*, 144; 8-10 km. north of Salonika, in flower and fruit, 13-4-17, *Turrill*, 49.
Distr. Eur., Asia.
Balkans: General.

Ervum tetraspermum, *L.*
Papiat District, Krusa Balkan, in flower and fruit, 6-18, *Russell*, 17.
Distr. Cent. and S. Eur., Orient, Temp. Asia.
Balkans: General.

Lens nigricans, *Godr.*
8-10 km. north of Salonika, small pale-blue flowers, 13-4-17, *Turrill*, 14; seeds collected on the southern slopes of the Krusa Balkan, north of Karamudli, 18-6-17, flowered at Kew, 3-7-18, *Turrill* (seed-number), 50.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

ROSACEAE.

Amygdalus communis, *L.*
Commonly cultivated in Macedonia, 10 km. north of Salonika, in flower, 5-2-17, *Turrill*.
Distr. Orient.
Balkans: Introduced.

Prunus divaricata, *Ledb.*
Near Gumus Dere, in flower, 4-18, *Russell*, 15.
Distr. S.-E. Eur., Orient.
Balkans: Maced., Thrace, Bulg.

Pyrus amygdaliformis, *Vill.*
South of Karamudli, in fruit, 13-7-17, *Turrill*, 489.
Distr. S.-E. Eur., Orient.
Balkans: General.
A form with long, narrow leaves with cuneate bases.

***Rubus tomentosus,** *Borkh.*
Nullahs to south of Karamudli, in flower, 29-6-17, *Turrill*, 452.
Distr. Cent. and S. Eur., Orient.
Balkans: Greece, Maced., Serb., Bulg., Thrace.

***Rubus collinus,** *DC.*
Between Turica and Kopriva, in flower, 24-5-17, *Turrill*, 304.
Distr. S. Eur.
Balkans: Not previously recorded.
White flowers with scent like flowers of hawthorn.

***Rubus anatolicus,** *Focke.*
Southern slopes of Krusa Balkan, north of Karamudli, in flower, 29-6-17, *Turrill*, 450.
Distr. Greece and Orient.

* Determined by R. A. Rolfe.

Fragaria viridis, *Duchsne.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris,* 220.
Distr. Eur., Orient.
Balkans: General.

Potentilla hirta, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris,* 250; foothills between Turica and Kopriva, in flower, 2-5-17, *Turrill,* 140.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

Potentilla recta, *L.*
Struma Plain and Krusa Balkan, in flower, 4 to 6-18, *Harris,* 39, 251, 353.
Distr. Cent. and S. Eur., Orient, Temp. Asia.
Balkans: General.

Potentilla argentea, *L.*
Paprat District, Krusa Balkan, in flower, 6-18, *Russell,* 56; hills west by south of Kopriva, small yellow flowers, 15-5-17, *Turrill,* 237.
Distr. Eur., Orient.
Balkans: General.
Strong perennial stock.

Potentilla reptans, *L.*
Paprat District, Krusa Balkan, in flower, 6-18, *Russell,* 57; Struma Plain, between Kopriva and Kopriva Bridge, in damp ground, yellow flowers, 26-5-17, *Turrill,* 328.
Distr. Eur., N. Afr., Orient, etc.
Balkans: General.

Geum urbanum, *L.*
Krusa Balkan, in flower and fruit, 6-18, *Harris,* 344.
Distr. Eur., Orient, N. Afr., Temp. Asia.
Balkans: General.
The deciduous portions of the styles in the young fruits are decidedly more hairy than usual.

***Rosa gallica,** *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris,* 295; Paprat District, Krusa Balkan, in flower, 6-18, *Russell,* 28; hills west by south of Kopriva, in flower, 15-5-17, *Turrill,* 236.
Distr. Cent. and S. Eur.
Balkans: Greece, Maced., Mtn., Serb.. Bulg.
Whole plant less than 1 ft. high, growing round the outside of bush clumps. Flowers large, pink, with a very sweet scent.

***Rosa foetida,** *Herrm.* (*R. lutea.,* Mill.)
Turica, probably planted, bright yellow flowers with strong unpleasant smell, 1-6-17, *Turrill,* 358.
Distr. Asia Minor to India.

* Determined by R. A. Rolfe.

*Rosa micrantha, *Smith.*
Near Turica, abundant on the foothills, a very sweetly scented briar, in flower, 28-5-17, *Turrill*, 346.
Distr. Cent. and W. Eur., Orient.
Balkans: Greece.
The petals are white and 5 to each flower, but there is a strong tendency for 1, 2 or 3 of these to be reduced in size and narrowed. They then develop yellow margins—probably with a tendency to produce pollen. These abnormal petals are most often 2 close together and they are the first to fade and fall off. Very few indeed, of the flowers have 5 perfectly normal petals.

Agrimonia odorata, *Mill.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 270; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 81; southern slopes of Krusa Balkan, west of Karamudli, in flower, 21-6-17, *Turrill*, 433.
Distr. Eur., N. Afr., Orient.
Balkans: General.

Agrimonia agrimonioides, *L.*
6 km. north-east of Lahana, in flower, 19-4-17, *Turrill*, 64.
Distr. S.-E. Eur., Orient.
Balkans: General.

Spiraea Filipendula, *L.*
Krusa Balkan, in flower, 6-18, *Harris*, 343; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 25; Gugunci, common on the hill-side, in flower, 15-5-17, *Baker*, 4.
Distr. Eur., Orient, Temp. Asia.
Balkans: Greece, Maced., Mtn., Serb., Bulg., Thrace.

ONAGRACEAE.

Epilobium parviflorum, *Schreb.*
South-east of Karamudli, pink flowers, 20-6-17, *Turrill*, 427; nullahs south of Karamudli, pink flowers, 15-7-17, *Turrill*, 498.
Distr. Eur., N. Afr., Orient.
Balkans: General.

LYTHRACEAE.

Lythrum Salicaria, *L.*
Krusa Balkan, in flower, 6-18, *Harris*, 385; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 68; southern slopes of Krusa Balkan, west of Karamudli, in flower, 4-7-17, *Turrill*, 474.
Distr. Eur., N. Afr., Orient, Temp. Asia, N. Amer., etc.
Balkans: General.

Lythrum virgatum, *L.*
Krusa Balkan, in flower, 6-18, *Harris*, 386.
Distr. E. and S.-E. Eur., Orient, N. Asia.
Balkans: General from Thessaly northwards.

* Determined by R. Rolfe.

TAMARISCINEAE.

Tamarix tetrandra, *Pall.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 16; Struma Plain, about 3 km. east of Orljak, in flower, 20-4-17, *Turrill*, 86.
Distr. Greece, Maced., Thrace, Orient.

PORTULACACEAE.

Portulaca oleracea, *L.*
Side of R. Spanc, near Snevce, yellow flowers, 17-7-17, *Turrill*, 518.
Distr. Temp. and warm parts of whole world.
Balkans: General.

PUNICACEAE.

Punica Granatum, *L.*
Cultivated at Turica, scarlet flowers, 1-6-17, *Turrill*, 359.
Distr. S.-E. Eur., Orient.
Balkans: Greece, Maced., Thrace.

PARONYCHIACEAE.

Polycarpon tetraphyllum, *L.*
Foothills near Turica, in flower, 24-5-17, *Turrill*, 307.
Distr. Eur., introduced into most parts of the world.
Balkans: Greece, Maced., Mtn.

Herniaria glabra, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 178.
Distr. Eur., Orient, Temp. Asia.
Balkans: General.

Herniaria cinerea, *DC.*
Struma Plain, about 3 km. east of Orljak, in flower and fruit. 20-4-17, *Turrill*, 90.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

SCLERANTHACEAE.

Scleranthus perennis, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 201; Paprat District, Krusa Balkan, in flower and fruit, 6-18, *Russell*, 69; south of Kocan mah. east Krusa Balkan, in flower, 12-6-17, *Turrill*, 408.
Distr. Eur.
Balkans: General.

Scleranthus verticillatus, *Tausch.*
8-10 km. north of Salonika, 13-4-17, *Turrill*, 25.
Distr. S. and Cent. Eur., Orient,
Balkans: General.

CRASSULACEAE.

Umbilicus pendulinus, *DC.*
On rocks in foothills, south-west of Turica, 30-5-17, *Turrill*, 356.
Distr. W. and S. Eur., N. Afr., Asia Minor.
Balkans: Greece, Maced., Mtn., Thrace.

Sedum Cepaea, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 179, 180; rocky slopes near Trinity Well, south-west of Turica, in flower, 7-5-17, *Turrill*, 398.
Distr. Cent. and S. Eur., Orient.
Balkans: General.
A rather small flowered form.

Sedum glaucum, *W. K.*
On rocks, hills between Turica and Gumus Dere, pinkish flowers, 5-6-17, *Turrill*, 378.
Distr. S. Eur., Orient.
Balkans: General.

Sedum rubens, *DC.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 274; rocky slopes of nullah near Trinity Well, south-west of Turica, in flower and fruit, 7-5-17, *Turrill*, 399.
Distr. S. Eur., N. Afr.
Balkans: Greece, Serb., Bulg.

Sedum caespitosum, *DC.*
Struma Plain and Krusa Balkan, in fruit, 4 & 5-18, *Harris*, 118.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

Sedum tenuifolium, *S. et S.* (*S. amplexicaule*, DC.)
Krusa Balkan, in flower, 6-18, *Harris*, 342.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced.

SAXIFRAGACEAE.

Saxifraga chrysoplenifolia, *Boiss.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 112.
Distr. Greece.

Saxifraga graeca, *Boiss. et Heldr.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 120.
Distr. Greece, Maced., Mtn., Herz., Serb., Bulg.

Saxifraga graeca, *Boiss. et Heldr.* var. **Russellii,** *Turrill*, var. nov.
A planta typica inflorescentia ramosiore, floribus numerosioribus, petalis minoribus differt.
Near Gumus Dere, 5-18, *Russell*, 2.

Orlaya grandiflora, *Hoffm.*

Struma Plain and Krusa Balkan, in flower, 5-18 *Harris*, 324; foothills between Turica and Kopriva, in flower and fruit, 5-6-17, *Turrill*, 374.

Distr. Cent. and S. Eur., Orient.

Balkans: General.

White florets, external ones with large abaxial petals.

Orlaya platycarpos, *L.*

Struma Plain and Krusa Balkan, in flower and fruit, 4 & 5-18, *Harris*, 147; between Turica and Kopriva, white flowers, 18-5-17, *Turrill*, 263.

Distr. S. Eur., N. Afr., Orient.

Balkans: General.

Daucus setulosus, *Gaertn.*

Between Kasimli and Snevce, in flower and fruit, 1-7-17, *Turrill*, 464.

Distr. Italy, S.-E. Eur., Orient.

Balkans: General.

This species is very common west and south of Karamudli. The great florets in the compound umbel have their petals, stamens and styles cream-white in colour, but often a few of the central florets have these parts wallflower-red in colour. Rarely all the florets are cream-white. The deep red florets vary in number and distribution of colour. Sometimes 1, 2, 3 or 4 florets, always in the centre of the umbel, are entirely red. Often some of the florets are partially red, partially cream-white. For instance, two petals or even two contiguous half-petals and the stamens and style nearest these may be red while the rest of the floret is cream-white. The stamens and ovaries are equally developed in red and white florets, and both develop fruits.

Caucalis leptophylla, *L.*

Struma Plain and Krusa Balkan, in flower and fruit, 4 & 5-18, *Harris*, 140; foothills between Turica and Kopriva, white flowers and fruit, 18-5-17, *Turrill*, 262.

Distr. S. Eur., N. Afr., Orient.

Balkans: General.

Caucalis latifolia, *L.*

Struma Plain and Krusa Balkan, in flower and fruit, 4 & 5-18, *Harris*, 67.

Distr. Cent. and S. Eur., N. Afr., Orient.

Balkans: Greece, Maced., Alb., Serb.

Tordylium maximum, *L.*

Southern slopes of Krusa Balkan, near Karamudli, in flower and fruit, 26-6-17, *Turrill*, 442.

Distr. Cent. and S. Eur., Orient.

Balkans: General.

Tordylium officinale, *L.*
Gugunci, Jeniköj and Uladaja Ravine, in flower, 4-5-17, *Baker*, 25,
Distr. Italy, S.-E. Eur.
Balkans: Greece, Maced., Mtn., Thrace.

Oenanthe media, *Griseb.*
Struma Plain and Krusa Balkan, in flower and young fruit, 4 & 5-18, *Harris*, 148, 241.
Distr. S.-E. Eur., Orient.
Balkans: General from Macedonia northwards.

Anthriscus vulgaris, *Pers.*
Struma Plain and Krusa Balkan, in flower and fruit, 4 & 5-18, *Harris*, 50.
Distr. Eur., Orient, N. Afr.
Balkans: Greece, Maced., Serb., Bulg., Thrace.

Scandix Pecten-Veneris, *L.*
8-10 km. north of Salonika, in flower and fruit, 13-4-17, *Turrill*, 28; seed collected near Turica, 12-5-17, flowered at Kew, 25-5-18, *Turrill* (seed-number), 23.
Distr. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Mtn., Serb., Bulg., Thrace.

Bunium Bulbocastanum, *L.*
Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 26.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Thrace.

Bupleurum apiculatum, *Friv.*
Near Trinity Well, south-west of Turica, in flower, 7-6-17, *Turrill*, 397.
Distr. Greece, Maced., Serb., Bulg.

Bupleurum laxum, *Vel.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 171; southern slopes of Krusa Balkan, west of Karamudli, flowers and young fruits, 16-7-17, *Turrill*, 512.
Distr. Maced., Serb., Bulg.
Yellow flowers, grass-like leaves.

Conium maculatum, *L.*
Struma Plain, near Ormanli, 20-5-17, *Turrill*, 277.
Distr. Eur., N. Afr., Orient, Temp. Asia.
Balkans: General.
This plant grows luxuriantly in the hot plain, reaching a height of 10 ft., and the huge, thick stems are used by troops to support their "bivies."

Smyrnium perfoliatum, *L.*
Struma Plain and Krusa Balkan, in flower, 4 to 6-18, *Harris*, 66, 348.
Distr. S. Eur. Orient.
Balkans: Greece, Maced., Mtn., Serb., Alb., Bulg.

Bifora testiculata, *DC.*
Struma Plain, about 3 km. east of Orljak, in flower and fruit, 23-4-17, *Turrill,* 95.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Thrace.

Eryngium campestre, *L.*
Near Snevce, blue flowers, 25-7-17, *Turrill,* 533.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

CORNACEAE.

Cornus sanguinea, *L.*
Foothills between Turica and Kopriva, in flower, 7-5-17, *Turrill,* 180.
Distr. Cent. and S. Eur., N. Asia.
Balkans: General.

CAPRIFOLIACEAE.

Sambucus Ebulus, *L.*
Uladaja Ravine, Kilindir and "Deep-cut" Ravine, near water-side, in flower, 12-6-17, *Baker,* 17; nullahs to south of Karamudli, strong pleasant smell to flowers, 15-7-17, *Turrill,* 502.
Distr. Eur., N. Afr., Orient.
Balkans: General.

Lonicera Caprifolium, *L.*
Hills between Turica and Gumus Dere, in flower and fruit, 5-6-17, *Turrill,* 376.
Distr. W., Cent. and S. Eur., Orient.
Balkans: General.
A form with green flowers.

Lonicera etrusca, *Santi.*
Near Turica, in flower, 15-5-17, *Turrill,* 211.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Mtn.

RUBIACEAE.

Galium Mollugo, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris,* 99, 233.
Distr. Eur., Orient.
Balkans: Greece, Maced., Mtn., Serb., Bulg., Thrace.
A form with stem and leaves densely puberulous.

Galium palustre, *L.*
Struma Plain and Krusa Balkan, in flower, 5 & 6-18, *Harris,* 289, 357; at side of pool between Kasimli and Snevce, white flowers, 1-7-17, *Turrill,* 458.
Distr. Eur., N. Afr.
Orient: Alb., Serb., Bulg., Thrace.

Galium verum, *L.*
Struma Plain and Krusa Balkan, in flower, 6 & 7-18, *Harris*, 341, 387; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 53; Kilindir, Jeniköj and Gugunci, in flower, 18-6-17, *Baker*, 10; near Karamudli, southern slopes of Krusa Balkan, yellow flowers, 28-6-17, *Turrill*, 444.
Distr. Eur., N. Afr., Orient, Temp. Asia.
Balkans: General.

Galium tricorne, *With.*
Struma Plain and Krusa Balkan, in flower and young fruit, 4 & 5-18, *Harris*, 83.
Distr. Eur., N. Afr., Orient.
Balkans: General.

Galium Cruciata, *Scop.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 119, 267.
Distr. Eur., Temp. Asia.
Balkans: General.

Galium parisiense, *L.*, var. **leiocarpum,** *Tausch.*
Near Trinity Well, south-west of Turica, in fruit, *Turrill*, 401.
Distr. Eur., N. Afr., Orient.
Balkans: Thrace.

Galium laconicum, *Boiss. et Heldr.*
Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 82; southern slopes of Krusa Balkan, near Karamudli, amongst bushes, white flowers, 26-6-17, *Turrill*, 443.
Distr. Greece.
The leaves are somewhat narrower than in the typical plant which is recorded from Epirus and Thessaly as well as from southern Greece.

Asperula arvensis, *L.*
Hills west by south of Kopriva, blue flowers and fruit, 15-5-17, *Turrill*, 231.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Crucianella graeca, *Boiss.*
Near Baisili, top of Krusa Balkan, amongst the herbage on the stony slopes, in flower, 24-6-17, *Turrill*, 438; near Baisili, 14-7-17, *Turrill*, 493.
Distr. S.-E. Eur., Asia Minor.
Balkans: Greece, Maced., Serb., Bulg., Thrace.

VALERIANACEAE.

Valerianella olitoria, *L.*
Near the well, Turica, in fruit, 25-5-17, *Turrill*, 314.
Distr. Eur., N. Afr., Orient.
Balkans: Greece, Serb., Bulg.

Valerianella membranacea, *Lois.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 219; 8-10 km. north of Salonika, in flower and young fruit, 13-4-17, *Turrill*, 48; seeds collected between Turica and Kopriva, 9-5-17, flowered at Kew, 4-6-18, *Turrill* (seed-number), 32.
Distr. S. Eur., Orient.
Balkans: General.
The upper leaves, excepting the one or two top pairs, are bifid or trifid with the lateral segments smaller.

DIPSACEAE.

Scabiosa ucranica, *L.*
Struma Plain and Krusa Balkan, in flower, 6-18, *Harris*, 324; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 41; nullahs to south of Karamudli, white flowers, 15-7-17, *Turrill*, 503.
Distr. S. Eur., Orient.
Balkans: General.

Scabiosa sicula, *L.*
Foothills near Turica, in flower and fruit, 24-5-17, *Turrill*, 309.
Distr. Spain, Sicily, Crete, Thrace, Orient.

Callistemma palaestinum, *L.*
Foothills south-west of Turica, blue flowers, 30-5-17, *Turrill*, 354.
Distr. S.-E. Eur., Orient.
Balkans: Greece, Maced., Thrace.

Knautia orientalis, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 7, 247; hill-slopes between Gumus Dere and Turica, in flower, 15-5-17, *Turrill*, 212.
Distr. Maced., Bulg., Thrace, Asia Minor.
The red florets are aggregated in small numbers in capitula. Most often only the ray type of floret is present. These have irregular corollas with 4 petals each. The abaxial petal is the largest and is broadly oblanceolate; the two lateral petals are shorter, smaller and lanceolate; the adaxial one is reduced to a mere white tooth one-third the size of the lateral petals. In larger heads, however, disc florets occur. These are almost regular and their corollas have each 4 equal teeth of the size, shape and colour of the adaxial tooth of the corolla in the ray florets. Transitions between the ray and disc florets were observed and in these the abaxial and lateral corolla teeth were less reduced than in the true disc florets.

Knautia hybrida, *Coult.*
Struma Plain, near Kopriva, blue flowers, 30-5-17, *Turrill*, 355.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

Knautia macedonica, *Griseb.*, subsp. **lyrophylla,** *Vel.* (*Panč.*)
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 269; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 23.
Distr. Maced., Herz., Bosnia, Serb., Bulg.

COMPOSITAE.

Doronicum caucasicum, *M. B.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 259.
Distr. S.-E. Eur., Orient.
Balkans: General.

Senecio vernalis, *W. K.*
Struma Plain and Krusa Balkan, in flower and fruit, 5-18, *Harris*, 258.
Distr. Cent. and S.-E. Eur., N. Afr., Orient.
Balkans: General.

Anthemis tinctoria, *L.*
Struma Plain and Krusa Balkan, in flower, 5 & 6-18, *Harris*, 208, 315, 325, 360; foothills between Turica and Kopriva, orange flowers, 18-5-17, *Turrill*, 261a.
Distr. Eur., Orient, N. Asia.
Balkans: General.

Anthemis Cota, *L.*
Kopriva, large heads, distinct scent, in flower, 4-6-17, *Turrill*, 366.
Distr. S. Eur., Orient.
Balkans: Greece, Maced., Bulg.

Anthemis arvensis, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 54, 139, 217.
Distr. Eur., N. Afr., Orient.
Balkans: General.

Anthemis Cotula, *L.*
Kopriva, very strong scent, in flower, 4-6-17, *Turrill*, 367.
Distr. Eur., N. Afr., Orient, Temp. Asia.
Balkans: General.

Achillea Millefolium, *L.*
Near Snevce, pale pink flowers, 24-7-17, *Turrill*, 541.
Distr. Eur., Orient, N. and Cent. Asia, N. Amer.
Balkans: Maced., Serb., Bulg.

Achillea crithmifolia, *W. K.*
Struma Plain and Krusa Balkan, in flower, 5 & 6-18, *Harris*, 249, 256; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 54; foothills to south of Kopriva, strong scent, dirty-white flowers, 30-5-17, *Turrill*, 357; south-east of Karamudli, 20-6-17, *Turrill*, 431.
Distr. S.-E. Eur.
Balkans: General.

Achillea clypeolata, *S. et S.*
Struma Plain and Krusa Balkan, in flower, 5 & 6-18, *Harris*, 89, 275; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 76; hills west by south of Kopriva, yellow flowers, 15-5-17, *Turrill* 232.
Distr. N. Greece, Maced., Serb., Bulg., Thrace.

Matricaria Chamomilla, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 138.
Distr. Eur., Orient, Temp. Asia.
Balkans: General.

Chrysanthemum segetum, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 105; Struma Plain, about 2 km. east of Orljak, yellow flowers, 23-4-17, *Turrill*, 96.
Distr. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Thrace.

Filago germanica, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 252; abundant in fields near Turica, in flower, 24-5-17, *Turrill*, 311.
Distr. Eur., Orient, N. Asia.
Balkans: General.

Filago arvensis, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 166; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 71; abundant in fields near Turica, in flower, 6-6-17, *Turrill*, 384.
Distr. Cent. and S. Eur., Orient, N. Asia.
Balkans: General.

Erigeron canadensis, *L.*
Struma Plain, between Kopriva and Kopriva Bridge, in flower, 26-5-17, *Turrill*, 326; nullahs to south of Karamudli, in flower, 15-7-17, *Turrill*, 497.
Distr. Eur., Orient, N. Amer.
Balkans: General.

Erigeron linifolius, *Willd.*
Struma Plain and Krusa Balkan, in fruit, 5-18, *Harris*, 323.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece.

Inula hirta, *L.*
Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 43.
Distr. Eur., Orient, Temp. Asia.
Balkans: General.

Inula salicina, *L.*
Southern slopes of Krusa Balkan, west of Karamudli, in flower, 21-6-17, *Turrill*, 435.
Distr. Eur., Orient, N. Asia.
Balkans: Alb., Bosnia, Mtn., Serb., Bulg., Thrace.

Inula germanica, *L.*
Krusa Balkan, in flower, 6-18, *Harris*, 363.
Distr. Cent. and S.-E. Eur., Orient.
Balkans: General from Thessaly northwards.

Inula britannica, *L.*
Krusa Balkan, in flower, 6-18, *Harris*, 388; southern slopes of Krusa Balkan, west of Karamudli, in flower, 7-7-17, *Turrill*, 477.
Distr. Cent. and S. Eur., Orient, N. Asia.
Balkans: Greece, Maced., Mtn., Serb., Bulg., Thrace.

Asteriscus aquaticus, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 64; between Turica and Kopriva, yellow flowers, 2-6-17, *Turrill*, 363.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Mtn., Thrace.

Helianthus annuus, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 185. An escape from cultivation. Native of N. America.

Echinops microcephalus, *S. et S.*
Southern slopes of Krusa Balkan, near Karamudli, blue heads of flowers, 10-7-17, *Turrill*, 508.
Distr. Balkans and Orient.
Balkans: Greece, Maced., Serb., Bulg., Thrace.

Carlina lanata, *L.*
Sarigol, near Kukus, 8-17, *Turrill*, 544.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Alb.

Xeranthemum annuum, *L.*
Struma Plain and Krusa Balkan, 5 & 6-18, *Harris*, 191, 369; foothills south of Turica, pink flowers, 27-5-17, *Turrill*, 339.
Distr. S. Eur., Asia Minor, Caucasus.
Balkans: Greece, Maced., Serb., Thrace.

Xeranthemum cylindraceum, *S. et S.*
Southern slopes of Krusa Balkan, south-east of Karamudli, pink flowers, 20-8-16, *Turrill*, 428.
Distr. S. Eur., Orient.
Balkans: General.

Carduus hamulosus, *Ehrh.*
Hills west by south of Kopriva, 15-5-17, *Turrill*, 239.
Distr. S.-E. Eur., Orient.
Balkans: Greece, Serb., Bulg.

Carduus pycnocephalus, *L.*
Seed collected near Turica, 6-6-17, flowered at Kew, 15-6-18, *Turrill* (seed-number), 39.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Mtn., Thrace.

Carduus pycnocephalus, *L.*, var. **cinereus,** *Boiss.*
Seeds collected between Turica and Kopriva, 30-5-17, flowered at Kew, 15-7-18, *Turrill* (seed-number), 22.
Distr. Caucasus, Transcaucasus.
This plant agrees well with the description given in Boissier, Flora Orientalis III., p. 521.

Silybum Marianum, *Gaertn.*
Seeds collected between Turica and Kopriva, 30-5-17, *Turrill* (seed-number), 33.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Thrace.
This is one of the commonest and most conspicuous of Macedonian plants. In the spring its rosettes of variegated green and white leaves are to be seen on the hills amongst *Quercus coccifera* bushes, in uncultivated places in the plains and on roadside banks. The flowering stems shoot up in March and April and may reach to 7 or 8 ft. in height. It was first found in flower in the Struma Plain, about 2 km. east of Orljak on 26-4-17.

Jurinea arachnoidea, *Bge.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 72, 239.
Distr. S.-E. Eur., Orient, Caucasus.
Balkans: Bulg.

Jurinea arachnoidea, *Bge.*, forma **integrifolia,** *Turrill.*
A forma typica foliis integris differt.
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 151.
Found occasionally with the type.

Carthamnus lanatus, *L.*
Foothills between Turica and Kopriva, yellow flowers, 2-6-17, *Turrill*, 361.
Distr. S. Eur., Orient.
Balkans: General.

Cnicus benedictus, *L.*
Struma Plain and Krusa Balkan, 4 & 5-18, *Harris*, 86; hill-slopes south-west of Turica, yellow flowers, 5-5-17, *Turrill*, 164.
Distr. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Bulg., Thrace.
Often grows in extensive clusters, ½ to 2 feet in height.

Centaurea pullata, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 107.
Distr. Portugal, Spain, S. France, Egypt.
The writer has no explanation to offer of the unusual distribution of this plant, for not having collected it himself he is unable to say whether it is more likely to be a native or an alien.

Centaurea stenolepis, *Kerner.*
Western end of Krusa Balkan, overlooking Lake Doiran, in bud, 1-7-17, *Turrill*, 468.
Distr. Hungary, Mtn., Serb., Bulg.

Centaurea Cyanus, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 123, 277; on stony hill-slopes between Turica and Gumus Dere, blue and white flowers, 5-6-17, *Turrill*, 382.
Distr. Eur., Orient.
Balkans: General.
Velenovsky (Fl. Bulg., p. 308) considers this a native of Bulgaria. In Macedonia also it occurs "non solum in campis cultis inter segetes sed etiam in collinis graminosis saxosisque ad montes."

Centaurea salonitana, *Vis.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 34; west of Karamudli, large yellow heads, 16-7-17, *Turrill*, 509.
Distr. S.-E. Eur.
Balkans: General.

Centaurea solstitalis, *L.*
Between Kasimli and Snevce, yellow flowers, 1-7-17, *Turrill*, 461.
Distr. Cent. and S. Eur., Orient.
Balkans: General.

Centaurea Calcitrapa, *L.*
Near Karamudli, red flowers, 4-7-17, *Turrill*, 475.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Centaurea subIanata, *Boiss.*
Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 39; Krusa Balkan, 6-18, *Harris*, 349; southern slopes of Krusa Balkan, north of Karamudli, red flowers, 29-6-17, *Turrill*, 451.
Distr. Maced., Bulg., Thrace.

Centaurea Scabiosa, *L.* var. **tenuiloba,** *Boiss.*
Between Mirova and Kurkut, Krusa Balkan, deep carmine flowers, 14-6-17, *Turrill*, 411.
Distr. Maced.
The following are synonyms of this variety, which is probably worth specific rank: *Centaurea atrofusca*, Janka, in Herb. Kew, ined.; *Centaurea atropurpurea*, Griseb., non W. K.; *Centaurea cuneifolia*, DC., var. *angustiloba*, DC.

Crupina vulgaris, *Cass.*
Struma Plain and Krusa Balkan, 4 & 5-18, *Harris*, 14; near Kopriva, pink flowers, 10-5-17, *Turrill*, 191; Gumus Dere, in flower, 7-6-17, *Turrill*, 387.
Distr. S. Eur., Orient.
Balkans: Greece, Maced., Mtn., Serb., Bulg., Thrace.

Sonchus asper, *Vill.*
Ravine between Turica and Kopriva, in flower and fruit, 29-5-17, *Turrill*, 348.
Distr. Cosmopolitan.
Balkans: General.

Lactuca Scariola, *L.*
Nullah south of Karamudli, in flower and fruit, 23-7-17, *Turrill*, 522.
Distr. Cent. and S. Eur., N. Afr., Orient, N. Asia.
Balkans: Greece, Serb., Bulg.
The broad leaves have a basal twist which makes them stand out edgeways from the stem.

Chondrilla juncea, *L.*
Krusa Balkan, in flower and fruit, 6-18, *Harris*, 395; southern slopes of Krusa Balkan, near Karamudli, in flower and fruit, 16-7-17, *Turrill*, 507.
Distr. Eur., Orient, N. Asia.
Balkans: Greece, Maced., Serb., Bulg., Thrace.

Taraxacum megalorrhizon, *Hand.-Maz.*
Near Akbunar, 9 km. north-west of Salonika, 10-17, *Turrill*, 550.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

Tolpis umbellata, *Bert.*
Hills between Turica and Gumus Dere, in flower, 25-5-17, *Turrill*, 318.
Distr. S. Eur., Orient.
Balkans: Greece.
Outer florets pale yellow, inner florets darker brown-yellow.

Crepis setosa, *Hall.*
Struma Plain and Krusa Balkan, in flower and fruit, 5-18, *Harris*, 254; near Kopriva, 15-5-17, *Turrill*, 242.
Distr. Cent. and S.-E. Eur., Orient.
Balkans: General.

Crepis neglecta, *L.*
Struma Plain and Krusa Balkan, 4 & 5-18, *Harris*, 53, 299; 8-10 km. north of Salonika, in flower and fruit, 13-4-17, *Turrill*, 21.
Distr. Italy, S.-E. Eur.
Balkans: Greece, Maced., Mtn., Herz., Thrace.

Hieracium Bauhini, *Schult.* (following the nomenclature of Velenovsky, Fl. Bulg., p. 340).
Foothills between Turica and Kopriva, long stolons, yellow heads, 25-5-17, *Turrill*, 313.
Distr. Eur., Asia Minor, Caucasus.
Balkans: General.

Hedypnois cretica, *L.*
Foothills near Turica, in fruit, 4-5-17, *Turrill*, 144; seed collected near Turica, 24-5-17, flowered at Kew, 1-6-18, *Turrill* (seed number), 20.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced.

Zacyntha verrucosa, *Gaertn.*
Between Turica and Kopriva, yellow flower-heads, 17-5-17, *Turrill*, 255.
Distr. S. Eur., Orient.
Balkans: General.

Tragopogon porrifolius, *L.*
Struma Plain, 3 km. east of Orljak, blue flowers, 20-4-17, *Turrill*, 93.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

Tragopogon pratensis, *L.*
Struma Plain and Krusa Balkan, in flower and fruit, 4 to 6-18, *Harris*, 71, 332.
Distr. Eur., Orient, Temp. Asia.
Balkans: General.

Scorzonera laciniata, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 33, 192, 222; between Turica and Kopriva, yellow flowers, 2-5-17, *Turrill*, 141.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Hypochaeris radicata, *L.*
Near Kopriva in fruit, 15-5-17, *Turrill*, 241.
Distr. Eur., N. Afr., Orient.
Balkans: General.

Hypochaeris glabra, *L.*
Seeds collected near Trinity Well, south-west of Turica, 7-6-17, flowered at Kew, 15-6-18, *Turrill* (seed-number), 42.
Distr. Eur., N. Afr., Orient.
Balkans: General.
This plant represents a form in which all the fruits have a sessile pappus, that is, the achenes have no beaks. This appears to be an inherited character, for it occurred in the parent and in all the plants raised in the first filial generation.

Scolymus hispanicus, *L.*
Near "Plane Tree Well," west of Karamudli, yellow flowers, 30-6-17, *Turrill*, 457.
Distr. S. Eur., Orient.
Balkans: General.

Cichorium Intybus, *L.*, var. **glabratum,** *Presl.*
Krusa Balkan, in flower, 6-18, *Harris*, 365; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 44.
Distr. S. Eur., Orient, Temp. Asia.
Balkans: Probably general.
This is one of the commonest plants in flower, in July and is abundant wherever there is enough shade and moisture. A white-flowered form was seen in an old orchard south of Snevce, 24-7-17.

Lapsana communis, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 74.
Distr. Eur., N. Afr., Orient, Temp. Asia.
Balkans: General.

Xanthium spinosum, *L.*
Near Alexsia, in flower, 24-7-17, *Turrill*, 529.
Distr. Eur., Orient.
Balkans: Greece, Mtn., Serb., Bulg., Thrace.

Xanthium strumarium, *L.*
Near Alexsia, in flower, 24-7-17, *Turrill*, 527.
Distr. Eur., N. Afr., Orient, N. Asia.
Balkans: Greece, Mtn., Serb., Bulg., Thrace.

Campanulaceae.

Campanula lingulata, *W. K.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 65, 318; hills west by south of Kopriva, blue glomerate flowers, 15-5-17, *Turrill*, 219; foothills between Turica and Kopriva, 17-5-17, *Turrill*, 251.
Distr. S.-E. Eur.
Balkans: General north of Thessaly.

Campanula scutellata, *Griseb.*
Struma Plain and Krusa Balkan, in flower, 5 & 6-18, *Harris*, 243, 272, 280, 287, 399; foothills between Kopriva and Turica, in flower, 23-5-17, *Turrill*, 293; southern slopes of Krusa Balkan, near Karamudli, in flower and fruit, 7-7-17, *Turrill*, 476.
Distr. Maced., Serb.

Campanula persicifolia, *L.*
Near Trinity Well, south-west of Turica, large, deep-blue flowers, 7-6-17, *Turrill*, 394; nullahs to south of Karamudli, in flower, 29-6-17, *Turrill*, 453.
Distr. N., Cent. and S. Eur., Asia Minor, N. Asia.
Balkans: General.
The two specimens recorded above have nearly sessile flowers. The species shows a considerable amount of variation in the shape, size and pubescence of the calyx-lobes and receptacle (ovary).

Campanula phrygia, *Jaub.*, var. **serbica,** *Adamov.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 41; Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 181, 314; Paprat District, Krusa Balkan, in flower, 5-18, *Russell*, 77; Struma Plain, about 3 km. south-east of Orljak, blue flowers, 20-4-17, *Turrill*, 75.
Distr. Maced., Serb.

Campanula Rapunculus, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 317; between Turica and Kopriva, in flower, 14-5-17, *Turrill*, 205; between Turica and Kopriva, in flower, 16-5-17, *Turrill*, 245.
Distr. Eur., N. Afr., Orient, N. Asia.
Balkans: General.

Campanula Spruneriana, *Hmpe.*
Southern slopes of Krusa Balkan, south-east of Karamudli, large blue flowers, 20-6-17, *Turrill*, 432.
Distr. Greece.
There is a considerable amount of variation in this species as regards the indumentum of the stems, the size of the corollas and the length of the calyx segments. These last are most often erect but in our specimens they are always spreading when the corollas have faded and sometimes before.

Campanula Spruneriana, *Hmpe.*, var. **lepidota,** *Turrill*, var. nov. A planta typica receptaculo (ovario) lepidoto differt.
Krusa Balkan, in flower, 6-18, *Harris*, 358; southern slopes of Krusa Balkan, south-east of Karamudli, large blue flowers, 20-6-17, *Turrill*, 432a.

Campanula athoa, *Boiss.*
Nullahs to south of Karamudli, amongst bushes, growing to 4 ft. in height, flowers, blue, 15-5-17, *Turrill*, 499.
Distr. Greece, Maced., Syria.

Specularia Speculum, *A. DC.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 15, 195; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 90; Struma Plain, about 3 km. south-east of Orljak, in flower, 20-4-17, *Turrill*, 81.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Specularia Speculum, *A. DC.*, var., **pubescens,** *A. DC.*
Struma Plain and Krusa Balkan, in flower, 6-18, *Harris*, 242.
Distr. Occasionally with the type.

Jasione Heldreichii, *Boiss.*
Struma Plain and Krusa Balkan, in flower, 6 & 7-18, *Harris*, 329; near Trinity Well, south-west of Turica, in flower, 7-6-17, *Turrill* 395; southern slopes of Krusa Balkan, north of Karamudli, in flower, 29-6-17, *Turrill*, 447.
Distr. Balkans and northern part of Asia Minor.

OLEACEAE.

Jasminum fruticans, *L.*

Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 221; about 3 km. south-east of Orljak, Struma Plain, yellow flowers, 20-4-17, *Turrill*, 91.

Distr. S. Eur., N. Afr., Orient.

Balkans: Greece, Maced., Alb., Bulg., Thrace.

Ligustrum vulgare, *L.*

About 2 km. east of Orljak, Struma Plain, 23-4-17, *Turrill*.

Distr. Eur., Orient.

Balkans: General.

Fraxinus Ornus, *L.*

Hills between Turica and Gumus Dere, 15-5-17, *Turrill*, 230.

Distr. Cent. and S. Eur., Orient.

Balkans: General.

APOCYNACEAE.

Vinca herbacea, *W. K.*

Krusa Balkan, in flower, 6-18, *Harris*, 396.

Distr. E. and S. E. Eur., Orient.

Balkans: Greece, Serb., Bulg., Thrace.

ASCLEPIADACEAE.

Periploca graeca, *L.*

Ravine between Turica and Kopriva, climbing over bushes, in flower, 29-5-17, *Turrill*, 347; Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 162.

Distr. S.-E. Eur., Orient.

Balkans: Greece, Maced., Alb., Mtn., Bulg., Thrace.

The corolla lobes are oblong to very slightly lanceolate-oblong with a rounded apex. Below they are pale yellow-green, above they are dark dull red-purple except for a pale yellow-green margin and apex and a grey blotch near the base. Short white hairs cover the basal part of the upper surface and gradually diminish in numbers towards the apex, becoming restricted at first to the sides, then to the margin, and finally disappearing altogether just below the apex. The hairs on each lobe are continued higher up towards the apex on the right side than on the left. The staminal corona consists of 5 long horns, alternating with the corolla lobes and each tapering to a slightly bifid apex. At the base of each there are two lateral projections, one on the left and one on the right, arising respectively from the right and left halves of the neighbouring corolla-lobes. On the inner face of each lateral projection a ridge runs longitudinally and directs itself to the left or right edge of the filament as the case may be. The whole corona is dark dull red-purple. The left and right projections of two contiguous corolla-lobes with their ridges and the left and right filaments surround the hole by which the pollinating insect can reach the pollinia. The filaments are broad and the connectives are covered with a dense tuft of white hairs, otherwise the whole stamen is of a pale yellow colour.

This plant has been suspected of poisoning Army horses.

Vincetoxicum speciosum, *Boiss. et Sprun.*
Hills between Turica and Gumus Dere, dull purple-black flowers, 5-6-17, *Turrill*, 375.
Distr. Greece, Mt. Athos, Bithynia.

Marsdenia erecta, *R. Br.*
Struma Plain and Krusa Balkan, in flower, 6-18, *Harris*, 336; hills west by south of Kopriva, in bud, 15-5-17, *Turrill*, 244; hills between Turica and Gumus Dere, in full flower, 25-5-17, *Turrill*, 322.
Distr. Balkans, Orient.
Balkans: Greece, Maced., Alb., Bulg., Thrace.
A low, much-branched shrub, with opposite leaves and dense masses of white flowers. It has a very fine effect when in full bloom and then emits a fairly strong smell not unlike that of elder.
A specimen named *Vincetoxicum cordatum*, Adamov., in Herb. Kew, is *Marsdenia erecta*, R. Br., as is also the plant recorded from Cyprus as *Vincetoxicum officinale* by Thompson.

GENTIANACEAE.

Erythraea Centaurium, *Pers.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 169, 209; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 78; hills between Turica and Gumus Dere, deep pink flowers, *Turrill*, 377; south of Karamudli, pink flowers, 15-7-17, *Turrill*, 494.
Distr. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Serb., Bulg., Thrace.

CONVOLVULACEAE.

Calystegia Sepium, *R. Br.*
Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 74.
Distr. Eur., Orient, Temp. Asia, N. Amer.
Balkans: General.

Convolvulus Cantabrica, *L.*
Struma Plain and Krusa Balkan, 4 & 5-18, *Harris*, 28.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Convolvulus arvensis, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 152, 313.
Distr. Most temperate and warm countries.
Balkans: General.

Convolvulus arvensis, *L.* var. **linearifolius,** *Chois.* (*Convolvulus acetoselloides*, Adamov. in Herb. Kew).
Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 58; near Snevce, pink-white flowers, 24-7-17, *Turrill*, 536.
Distr. Commonly found with the type.
Most often prostrate but sometimes climbing up the bracken, etc., to 3 ft. Very common.

Convolvulus tricolor, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 227; "Buc-hill," near Kilindir, in flower, 1-6-17, *Baker*, 11; 8 km. north of Salonika, in flower, 13-4-17, *Turrill*, 55.
Distr. S. Eur., from Portugal to Dalmatia, N. Afr.
Boissier records this species from Bithynia but thinks it was a garden escape, and Halácsy records it from Zacynthus, otherwise Dalmatia appears to be the most easterly locality from which it has hitherto been recorded.

Convolvulus tenuissimus, *S. et S.*
8-10 km. north of Salonika, in flower, 13-4-17, *Turrill*, 35.
Distr. S.-E. Eur., Orient, N. Afr.
Balkans: Greece, Maced.

Cuscuta Epithymum, *L.*
Gumus Dere, white flowers, 7-6-17, *Turrill*, 386.
Distr. Eur., N. Afr., Orient, N. Asia.
Balkans: Greece, Serb., Bulg.
Parasite on *Thymus* sp.

BORAGINACEAE.

Heliotropium suaveolens, *M. B.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 189; foothills south of Turica, white flowers with a very sweet scent, 27-5-17, *Turrill*, 341.
Distr. S.-E. Eur., Orient.
Balkans: Maced., Bulg., Thrace.

Symphytum bulbosum, *Schimper.*
8-10 km. north of Salonika, in flower, 13-4-17, *Turrill*, 43.
Distr. Cent. and S. Eur., Troas.
Balkans: Greece, Mtn., Bulg., Thrace.

Anchusa officinalis, *L.*
Struma Plain and Krusa Balkan,, in flower, 4 & 5-18, *Harris*, 84; Uladaja Ravine and Gugunci, found in shady places, in flower, 14-6-17, *Baker*, 3; 8-10 km. north of Salonika, in flower, 13-4-17, *Turrill*, 53; foothills south of Turica, red-purple flowers, 27-5-17, *Turrill*, 345; hills between Gumus Dere and Turica, deep violet flowers, 15-5-17, *Turrill*, 221.
Distr. Eur., Orient.
Balkans: General.
Two very distinct colour forms were recognized near Turica, the one with red-purple corollas the other with deep violet corollas. Besides the colour difference, *Turrill*, 345, has less acute sepals and a shorter style than *Turrill*, 221, but these characters vary independently as an examination of numerous living examples in the field showed.

Anchusa italica, *Retz.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 26, 153; foothills between Turica and Kopriva, in flower, 30-4-17, *Turrill*, 124.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.
A very fine-looking plant with fimbriate scales in the throat of the blue corolla.

Nonnea ventricosa, *Griseb.*
Struma Plain and Krusa Balkan, in flower and fruit, 4 & 5-18, *Harris*, 76, 142; foothills near Turica, white flowers with large calyces, 4 & 5-17, *Turrill*, 145.
Distr. S. Eur., Orient. ,
Balkans: Greece, Maced., Bulg., Thrace.

Cerinthe major, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 5, 303; Struma Plain, about 2 km. south-east of Orljak, *Turrill*, 111.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece.

Echium italicum, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 291; foothills between Turica and Kopriva, pale blue or pink flowers, 29-5-17, *Turrill*, 350.
Distr. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Serb., Bulg., Thrace.
A fine, tall plant, to 5 ft. in height, much branched. The flowers have long filaments.

Echium vulgare, *L.*
Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 88.
Distr. Eur., Orient, Temp. Asia.
Balkans: General.

Echium plantagineum, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 143, 187; Uladaja and Kilindir, in shady places, 16-6-17, *Baker*, 16; foothills between Orljak and Turica, large blue flowers, 29-4-17, *Turrill*, 112.
Distr. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Bulg., Thrace.

Onosma tauricum, *Pall.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 122, 194; Uladaja Ravine, hill-side, in flower, 14-6-17, *Baker*, 2.
Distr. Austr.-Hung., Greece, Maced., Serb., Bulg., Thrace, Taurus.

Lithospermum purpureo-coeruleum, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 22, 130; 6 km. north-east of Lahana, Seres Road, hill country, in flower, 19-4-17, *Turrill*, 67.
Distr. Cent. and S. Eur., Orient.
Balkans: Greece, Mtn., Serb., Bulg.

Lithospermum arvense, *L.*
Struma Plain and Krusa Balkan, in fruit, 4 & 5-18, *Harris*, 137; seed collected near Turica, 22-5-17, flowered at Kew, 25-5-18, *Turrill* (seed-number), 8.
Distr. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Mtn., Serb., Bulg., Thrace.

Lithospermum Sibthorpianum, *Griseb.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 301.
Distr. Greece, Orient.
The stems in this specimen are ascending, not prostrate.

Lithospermum apulum, *Vahl.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 18; 8-10 km. north of Salonika, yellow flowers, 13-4-17, *Turrill*, 27.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Bulg., Thrace.

Myosotis idaea, *Boiss.*
8-10 km. north of Salonika, growing on the hill-side mixed with *M. collina*, Hoffm., *Turrill*, 12a.
Distr. Greece, Maced., Mtn., Bulg., Thrace, Asia Minor.

Myosotis cadmea, *Boiss.*
Struma Plain and Krusa Balkan, in flower and fruit, 4 & 5-18, *Harris*, 29, 266.
Distr. Greece, Maced., Bulg., Orient.

Myosotis collina, *Hoffm.*
Struma Plain and Krusa Balkan, in flower and fruit, 4 & 5-18, *Harris*, 131; 8-10 km. north of Salonika, small blue flowers, 13-4-17, *Turrill*, 12.
Distr. Eur., N. Afr., Orient.
Balkans: General.

Myosotis intermedia, *Link.*
Between Turica and Kopriva, in flower, 12-5-17, *Turrill*, 196.
Distr. Eur., Orient, N. Asia.
Balkans: Greece, Mtn., Serb., Bulg., Thrace.

Cynoglossum pictum, *Ait.*
Struma Plain and Krusa Balkan, in flower and fruit, 5 & 6-18, *Harris*, 296, 359; near Turica, blue-veined flowers, 11-5-17, *Turrill*, 192.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.
The plant grows to a height of 4 ft.

Asperugo procumbens, *L.*
Kopriva, in flower, 30-4-17, *Turrill*, 130.
Distr. Eur., N. Afr., Orient, N. Asia.
Balkans: Greece, Maced., Mtn., Serb., Bulg., Thrace.

SOLANACEAE.

Datura Stramonium, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 230.
Distr. Cent. and S. Eur., Afr., Orient, Asia, etc.
Balkans: General.

Hyoscyamus niger, *L.* var. **pallidus,** *W.K.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 230a.
Distr. Eur., N. Afr., Orient, Temp. Asia, India.
Balkans: Probably general.

Solanum Dulcamara, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 288.
Distr. Eur., N. Afr., Orient, Temp. Asia.
Balkans: General.

SCROPHULARIACEAE.

Verbascum thapsiforme, *Schrad.*
Southern slopes of the Krusa Balkan, north of Karamudli, in flower, 10-7-17, *Turrill*, 484; east of Karamudli, in flower, 20-7-17, a form with the leaves and stems more densely tomentose than in 484, growing on the side of a nullah above a small stream, *Turrill*, 520.
Distr. Cent. and S. Eur., Orient.
Balkans: Greece, Serb., Bulg.
This is a very common summer-flowering species on the hillsides. The plants stand up at intervals like sentinels.

Verbascum bulgaricum, *Vel.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 271; southern slopes of Krusa Balkan, east of Karamudli, 20-7-17, *Turrill*, 521.
Distr. Serb., Bulg.

Verbascum Blattaria, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 60; south of Snevce, in flower and fruit, 24-7-17, *Turrill*, 530.
Distr. Eur., N. Afr., Orient, N. Asia.
Balkans: Greece, Maced., Mtn., Serb., Bulg., Thrace.

Scrophularia Scopolii, *Hoppe.*
Struma Plain and Krusa Balkan, in flower and fruit, 5-18, *Harris*, 285; nullahs to south of Karamudli, flowers and fruits, 29-6-17, *Turrill*, 454; south of Snevce, 24-7-17, *Turrill*, 531.
Distr. Cent. and S. Eur., Orient.
Balkans: Greece, Maced., Serb., Bulg., Thrace.

Digitalis lanata, *Ehrh.*
Struma Plain and Krusa Balkan, in flower, 6 & 7-18, *Harris,* 368; Paprat District, Krusa Balkan, in flower, 6-18, *Russell,* 80; Kilindir, in flower, 18-6-17, *Baker,* 15; hills between Turica and Gumus Dere, flowers dull-white with basal purple part and veins orange-brown, 25-5-17, *Turrill,* 321; south-east of Karamudli, southern slopes of Krusa Balkan, in flower and fruit, 20-8-16, *Turrill,* 418.
Distr. S.-E. Eur., Asia Minor.
Balkans: General.

Digitalis ambigua, *Murr.*
Southern slopes of Krusa Balkan, south-east of Karamudli, in flower, 20-8-17, *Turrill,* 419.
Distr. Cent. and S. Eur., Orient, N. Asia.
Balkans: General.

Digitalis viridiflora, *Lindl.*
Krusa Balkan, in flower, 6-18, *Harris,* 413.
Distr. Thessaly, Maced., Bulg., Thrace.

Gratiola officinalis, *L.*
Struma Plain and Krusa Balkan, in flower, 5 & 6-18, *Harris,* 297, 345; between Kasimli and Snevce, near a pool, white flowers, 1-7-17, *Turrill,* 460.
Distr. Cent. and S. Eur., Orient, N. Asia.
Balkans: Greece, Maced., Alb., Serb., Bulg., Thrace.

Linaria Elatine, *Mill.*
Between Kasimli and Snevce, yellow-blue flowers and fruit, 1-7-17, *Turrill,* 466.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Linaria genistaefolia, *Mill.*
Struma Plain and Krusa Balkan, in flower and fruit, 5 & 6-18, *Harris,* 216, 273, 290, 328; in a field near Turica, often growing to 3 ft. in height and much branched, in flower and fruit, 27-5-17, *Turrill,* 337.
Distr. S.-E. Eur., Orient, N. Asia.
Balkans: Thessaly, Maced., Alb., Serb., Bulg., Thrace.

Linaria simplex, *DC.*
Struma Plain and Krusa Balkan, in fruit, 4 & 5-18, *Harris,* 23; 8-10 km. north of Salonika, very small yellow flowers, 13-4-17, *Turrill* 19; seed collected near Turica, 5-5-17, flowered at Kew, 5-6-18, young fruit, 15-6-18, *Turrill* (seed-number), 1.
Distr. Cent. and S. Eur.. Orient.
Balkans: Greece, Thrace.

Linaria Pelisseriana, *Mill.*
Struma Plain and Krusa Balkan, in flower and fruit, 5-18, *Harris* 237, 306: Struma Plain about 3 km. south-east of Orljak, blue flowers, 27-4-17, *Turrill.* 107.
Distr. Cent. and S. Eur., Orient.
Balkans: Greece, Maced., Bulg., Thrace.

Veronica Anagallis, *L.*
Struma Plain and Krusa Balkan, in flower and fruit, 5-18, *Harris*, 184; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 93.
Distr. Throughout the Northern Hemisphere.
Balkans: General.

Veronica verna, *L.*
Struma Plain and Krusa Balkan, in fruit, 5-18, *Harris*, 173.
Distr. Eur., Orient, N. Asia.
Balkans: Greece, Serb., Bulg.

Bartsia latifolia, *S. et S.*
6 km. north-east of Lahana, pink flowers, 19-4-17, *Turrill*, 70; hill-slopes south-west of Turica, in fruit, 5-5-17, *Turrill*, 158.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

Euphrasia salisburgensis, *Funck.*
Western end of Krusa Balkan, overlooking Lake Doiran, white-blue flowers, 1-7-17, *Turrill*, 472.
Distr. Eur.
Balkans: General.

OROBANCHACEAE.

Orobanche ramosa, *L.*
Foothills between Turica and Kopriva, in flower, 21-5-17, *Turrill*, 282.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Orobanche nana, *Noë.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 35.
Distr. S. Eur., Orient, Madeira.
Balkans: Greece, Mtn., Serb., Thrace.

Orobanche Esulae, *Pančić.*
Near Ormanli, Struma Plain, in flower, 20-5-17, *Turrill*, 275a.
Distr. Serbia (near Nish, etc.)
This plant has been named from the description given in Beck's "Monogr. Orobanche," p. 237. The only character in which our plant fails to agree with the description is in the glabrous or nearly glabrous corolla. According to Beck the corollas of *O. Esulae* are glandular-pilose, but the example he figures is glabrous! Our plant, which was collected under difficulties, was parasitic on a *Euphorbia*, very probably *E. Esula*. Unfortunately it was sent home in a consignment which was submerged *en route* and afterwards salvaged. The submersion evidently damaged the specimen considerably and possibly destroyed the indumentum on the corollas. A few glandular hairs remain at the base of some of the corollas. The size, shape and colour given to Beck's figure of the corolla of *O. Esulae* match our examples exactly.

Orobanche minor, *Sutton.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 48; nullahs south of Karamudli, in flower, 15-7-17, *Turrill*, 505a.
Distr. Eur., N. Afr., Asia Minor.
Balkans: General.

Orobanche Picridis, *Schultz.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 47, 145; between Turica and Kopriva, in flower, 5-5-17, *Turrill*, 151.
Distr. Cent. and S. Eur., Orient.
Balkans: Greece, Mtn., Serb.
Parasitic on *Lactuca* sp.

VERBENACEAE.

Verbena officinalis, *L.*
Struma Plain and Krusa Balkan, in flower, 5 & 6-18, *Harris*, 190, 391; near Turica, pink flowers, 21-5-17, *Turrill*, 287.
Distr. Most temperate regions.
Balkans: General.

LABIATAE.

Teucrium Chamaedrys, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 193; foothills between Turica and Kopriva, red flowers, 17-5-17, *Turrill*, 253.
Distr. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Herz., Bulg., Thrace.

Teucrium Polium, *L.*
Struma Plain and Krusa Balkan, in flower, 6-18, *Harris*, 339; southern slopes of Krusa Balkan, north of Karamudli, in flower, 29-6-17, *Turrill*, 446.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

Ajuga genevensis, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 36, 182, 188.
Distr. N. and Cent. Eur., Asia Minor, Caucasus.
Balkans: Maced., Serb., Bosnia, Bulg.

Ajuga Chamaepytis, *Schreb.*
Struma Plain and Krusa Balkan, yellow flowers, 4 & 5-18, *Harris*, 73; between Orljak and Turica, in flower, 29-4-17, *Turrill*, 115.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkan: Greece, Mtn., Serb., Bulg.

Salvia argentea, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 97.
Distr. S. Eur., N. Afr., Asia Minor.
Balkans: Greece, Maced., Serb., Bulg.

Salvia amplexicaulis, *Rohb.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 292, 316; Buc-hill and Gugunci, in flower, 14-6-17, *Baker*, 13; near Turica, coll. Staff-Serg. Firth, red flowers, 17-5-17, *Turrill*, 266.
Distr. S.-E. Eur.
Balkans: General.

Salvia Horminum, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 24, 117; foothills between Turica and Kopriva, in flower 30-4-17, *Turrill*, 125; seeds collected near Turica, 6-6-17, flowered at Kew, 18-6-18, *Turrill* (seed-number), 40.
Distr. S.-E. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Serb., Bulg.

Salvia clandestina, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 260; 8-10 km. north of Salonika, blue and white flowers, 13-4-17, *Turrill*, 11.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Thrace.

Ziziphora capitata, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 1, 232; foothills between Kopriva and Turica, red flowers in terminal capitula-like inflorescences, 17-5-17, *Turrill*, 248.
Distr. S.-E. Eur., Orient.
Balkans: General.

Scutellaria Columnae, *All.*
Foothills to south of Turica, in flower, 27-5-17, *Turrill*, 353.
Distr. S.-E. Eur., N. Afr.
Balkans: General.

Scutellaria albida, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 111; foothills near Turica, corollas yellowish-white, the lateral segments tinged with purple, 24-5-17, *Turrill*, 294.
Distr. S.-E. Eur., Orient.
Balkans: Thessaly, Maced., Bulg., Thrace.
Scutellaria Pichleri, Vel. non Stapf, is this species.

Prunella vulgaris, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 213, 256; Paprat District, Krusa Balkan, in fruit, 6-18, *Russell*, 19.
Distr. Cosmopolitan.
Balkans: General.

Prunella alba, *Pall.*
Struma Plain and Krusa Balkan, in flower, 5 & 6-18, *Harris*, 175, 410; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 29; foothills between Turica and Kopriva, white flowers, 4-6-17, *Turrill*, 371.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Serb., Bulg.

Melittis Melissophyllum, *L.*
Struma Plain and Krusa Balkan, in flower, 6-18, *Harris*, 264, 333; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 87; Struma Plain between Kopriva and Lake Butkova, coll. Staff-Sergt. Firth, 1-5-17, *Turrill*, 136; hills west by south of Kopriva, white flowers, 15-5-17, *Turrill*, 228.
Distr. Cent. and S. Eur.
Balkans: General.
All the plants enumerated above are large flowered with white corollas. A noteworthy character which seems fairly constant in most Balkan specimens examined by the writer is the large size of the calyx lobes, especially the adaxial lobe, which is sometimes much longer than the calyx tube and may be entire or bifid.

Lamium amplexicaule, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 133.
Distr. Eur., N. Afr., Orient, Temp. Asia.
Balkans: General.

Lamium maculatum, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 322.
Distr. Eur., Orient.
Balkans: General.

Betonica officinalis, *L.*
West end of Krusa Balkan, overlooking Lake Doiran, in flower, 1-7-17, *Turrill*, 469.
Distr. Eur., Orient.
Balkans: Greece, Maced., Serb., Bulg., Thrace.

Stachys germanica, *L.*
Southern slopes of Krusa Balkan, west of Karamudli, in flower, 16-7-17, *Turrill*, 514a.
Distr. Cent. and S. Eur., Orient.
Balkans: General.

Stachys italica, *Mill.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 283.
Distr. S. Eur., Orient.
Balkans: General.
The inflorescence is very young and more compact than usual.

Stachys angustifolia, *M.B.*
Krusa Balkan, in flower, 6-18, *Harris*, 351; .3 km. south of Kocan mah, Krusa Balkan, in flower, 12-6-17, *Turrill*, 410.
Distr. S.-E. Eur., Tauria.
Balkans: Greece, Maced., Bulg., Thrace.

Stachys annua, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 34.
Distr. Cent. and S. Eur., Orient.
Balkans: General.

Stachys plumosa, *Griseb.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 69, 234, 286; *Turrill*, 189, near Kopriva, in flower, 9-5-17; near Trinity Well, south-west of Turica, in flower, 7-6-17, *Turrill*, 396.
Distr. Maced., Serb., Bulg.

Leonurus Cardiaca, *L.*
Jeni mah, pink hairy flowers, 14-7-17, *Turrill*, 491.
Distr. Eur., Orient, N. Asia.
Balkans: Greece, Maced., Mtn., Bulg., Thrace.

Phlomis pungens, *Willd.*, var. **laxiflora,** *Vel.*
Between Kurkut and Alexsia, in flower, 15-6-17, *Turrill*, 413.
Distr. (of var.) Maced., Bulg.

Phlomis samia, *L.*
Hills to south-west of Turica, in flower, 8-6-17, *Turrill*, 403.
Distr. S.-E. Eur., Asia Minor.
Balkans: Greece, Maced.
A tall plant with dull mauve flowers.

Marrubium peregrinum, *L.*
Jeni mah, east of Karamudli, in flower, 14-7-17, *Turrill*, 492.
Distr. Cent. and S.-E. Eur., N. Afr., Orient.
Balkans: General.
A low, much branched, sub-shrubby plant.

Marrubium vulgare, *L.*
Nullah to south of Turica, small white flowers, 6-5-17, *Turrill*, 171.
Distr. Eur., N. Afr., Orient, N. Asia.
Balkans: General.

Sideritis montana, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 30; between Turica and Kopriva, white flowers whose upper lips go brown as the flowers open, 17-5-17, *Turrill*, 258.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Sideritis lanata *L.*
Struma Plain, about 3 km. east of Orljak, small yellow and black flowers, 20-4-17, *Turrill*, 74.
Distr. Greece, Asia Minor.

Nepeta nuda, *L.*
Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 37; near Baisili, top of Krusa Balkan, in flower, 24-6-17, *Turrill*, 440.
Distr. S. Eur., Orient.
Balkans: General.

Glechoma hirsuta, *W.K.*
6 km. north-east of Lahana, large blue flowers, 19-4-17, *Turrill*, 60.
Distr. S.-E. Eur.
Balkans: Mtn., Serb., Bulg., Thrace.

Melissa officinalis, *L.*
Karamudli, Southern slopes of Krusa Balkan, in flower, 12-7-17, *Turrill*, 488; nullahs to south of Karamudli, 15-7-17, *Turrill*, 505.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Mtn., Serb., Bulg., Thrace.

Clinopodium vulgare, *L.*
Struma Plain and Krusa Balkan, in flower, 4-18, *Harris*, 107; Paprat District, Krusa Balkan, in flower, 5-18, *Russell*, 84.
Distr. Eur., N. Afr., Orient, Temp. Asia.
Balkans: General.

Calamintha alpina, *Lam.*, var. **marginata,** *Borb.*
Southern slopes of Krusa Balkan, east of Karamudli, blue flowers, 9-7-17, *Turrill*, 480.
Distr. (of var.). Serb., Bulg.

Calamintha suaveolens, *Boiss.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 68, 165; hills west by south of Kopriva, in flower, 15-5-17, *Turrill*, 225.
Distr. Greece, Maced., Bulg., Thrace.
The colour of the flowers varies from deep lilac to pure white. All parts of the plant emit a very strong peppermint smell when crushed.

Origanum vulgare, *L.*
Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 67; nullahs to the south of Karamudli, in flower, 15-7-17, *Turrill*, 496.
Distr. Cent. and S. Eur., Orient.
Balkans: Greece, Maced., Serb., Bulg.

Thymus Marschallianus, *Willd.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 104; 8-10 km. north of Salonika, pink flowers, 13-4-17, *Turrill*, 13; seeds collected on southern slopes of Krusa Balkan north of Karamudli, 7-7-17, flowered at Kew, 15-7-18, *Turrill* (seed-number), 70.
Distr. S.-E. Eur., Orient.
Balkans: General.

Thymus macedonicus, *Adamov.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 115; 8-10 km. north of Salonika, white flowers, 13-4-17, *Turrill*, 34.
Distr. Maced.

Thymus Chaubardi, *Boiss. et Heldr.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 98, 255; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 62; found generally round Gugunci and Kilindir, in flower 20-6-17, *Baker*, 22; foothills between Turica and Kopriva, in flower 18-5-17, *Turrill*, 264.
Distr. Greece, Maced., Bulg.
The whole plant has a strong lemon smell.

Mentha sylvestris, *D'Urv.*
Struma Plain and Krusa Balkan, in flower, 6-18, *Harris*, 338: Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 75; south-east of Karamudli, southern slopes of Krusa Balkan, in flower, 20-7-17, *Turrill*, 422.
Distr. Eur., N. Afr., Orient.
Balkans: General.

Mentha Pulegium, *L.*
Weed in cultivated fields between Kasimili and Snevce, in flower, 1-7-17, *Turrill*, 462.
Distr. Eur., N. Afr., Orient.
Balkans: General.

Lycopus exaltatus, *L.f.*
Krusa Balkan, in flower, 6-18, *Harris*, 389.
Distr. Cent. and S.-E. Eur., Orient, Temp. Asia.
Balkans: Thessaly, Corfu, Serb., Bulg., Thrace, Temp. Asia.

Lycopus europaeus, *L.*
Side of R. Spanc, south of Snevce, in flower, 17-7-17, *Turrill*, 517.
Distr. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Serb., Bulg.

PRIMULACEAE.

Lysimachia atropurpurea, *L.*
6 km. north-east of Lahana, in flower, 19-4-17, *Turrill*, 72a.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Bulg., Thrace.

Lysimachia punctata, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 203; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 34; nullah in foothills to south of Turica, yellow flowers, 27-5-17, *Turrill*, 332.
Distr. Eur., Orient.
Balkans: Greece, Maced., Alb., Mtn., Herz., Serb., Bulg.

Lysimachia nummularia, *L.*
Krusa Balkan, in flower, 6-18, *Harris*, 355; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 16; south-east of Karamudli, nullah in southern slopes of Krusa Balkan, in flower, 20-8-16, *Turrill*, 426.
Distr. Eur., Orient.
Balkans: Greece, Maced., Serb., Bulg., Thrace.

Anagallis arvensis, *L.*
Paprat District, Krusa Balkan, in flower and fruit, 6-18, *Russell*, 83; foothills between Orljak and Turica, in flower, 29-4-17, *Turrill*, 117b; between Kopriva and Kopriva Bridge, Struma Plain, in flower and fruit, 26-5-17, *Turrill*, 331a.
Distr. Nearly cosmopolitan.
Balkans: General.

Anagallis arvensis, *L.*, var. **carnea,** *Schrank.* (*A. amoena,* Heldr.)

Foothills between Orljak and Turica, corollas white with a dark purple patch in the centre, 29-4-17, *Turrill,* 117d; between Turica and Kocan mah, pink corollas, 12-6-17, *Turrill,* 408a.

Distr. Occasionally found with the type.

Anagallis coerulea, *Schreb.*

Foothills between Orljak and Turica, blue flowers, 29-4-17, *Turrill,* 117c; between Kopriva and Kopriva Bridge, in flower and fruit, 26-5-17, *Turrill,* 331b.

Distr. Nearly cosmopolitan.

Balkans: General.

Anagallis platyphylla, *Baudo.*

On a bank just north of Turica, in flower, 29-4-17, *Turrill,* 117a.

Distr. Algeria, Morocco.

The status of the various forms of pimpernel is an interesting and debatable question. The writer examined hundreds of living specimens in Macedonia with the aid of a pocket lens, and his observations and conclusions favour the views expressed by Dr. Moss in the Journ. of Bot., 1911, p. 44. In Macedonia both the scarlet and blue pimpernels grow abundantly in arable fields, waste ground and on unbroken hill-sides. Quite often their stems are intermixed, but the colour differences always remain definite. The following characters vary independently in both plants: stems prostrate or ascending, acuteness of sepals, number of fringing and glandular hairs on the margins of the corolla lobes, the number of cells in the fringing hairs. *Anagallis coerulea* has usually more markedly crenate corolla lobes which are, relative to their breadth, narrower than those of *A. arvensis,* so that the flower has a looser appearance, the petals not overlapping when the corolla is open. White and pink-flowered forms are not uncommon. They are evidently derivatives of *A. arvensis,* for a complete series of shades, from bright scarlet through pink to white may be found, but all retain the central blotch of dark purple. The flowers of the white form, recorded above under the var. *carnea,* turned pink while being dried between newspapers. At Kocan mah specimens were found in which the tints of the corollas of pink-flowered forms varied even on the same plant. *Anagallis platyphylla* has apparently hitherto been recorded only from North Africa. It may have been introduced into Macedonia with fodder. It is a very remarkable plant with broad leaves, three or four at a node, long slender peduncles, and blue corollas 2 cm. in diameter.

Cyclamen neapolitanum, *Ten.*

Krusa Balkan, in flower, 6-7-18, *Harris,* 416; Gumus Dere, in flower, 10-17, *Russell.*

Distr. Cent. and S. Eur.

Balkans: Greece, Thrace (?).

Primula acaulis, *Jacq.*
Near Gumus Dere, south of Struma Plain, 5-18, *Russell*, 7.
Distr. Eur., N. Afr., Orient.
Balkans: Greece, Macedonia, Serb., Bulg., Thrace.

PLUMBAGINACAE.

Plumbago europaea, *L.*
Akbunar, 9 km. north of Salonika, in flower, 9-10-17, *Turrill*, 549.
Distr. Cent. and S. Eur., Orient.
Balkans: Greece, Serb., Alb., Bulg., Thrace.

Statice collina, *Boiss.*
Krusa Balkan, in flower, 6-18, *Harris*, 372.
Distr. Maced., Serb., Bulg., Thrace, Asia Minor, Syria.

Armeria Adamovicii, *Hal.*
Identified from the description in Osterr. Bot. Zeitschr., 1906, 279.
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, leaves slightly ciliate to glabrous, *Harris*, 44; Krusa Balkan, 6-18, a fine robust plant with densely pubescent leaves and large heads of white flowers, *Harris*, 370; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 22; near Mirova, white flowers, 13-6-17, *Turrill*, 409.
Distr. Maced.

PLANTAGINACEAE.

Plantago Psyllium, *L.*
8-10 km. north of Salonika, in flower, 13-4-17, *Turrill*, 31.
Distr. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Mtn., Thrace.

Plantago arenaria, *W. K.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 170; near Karamudli, in flower, 29-6-17, *Turrill*, 449.
Distr. Cent. and S. Eur., Orient.
Balkans: General.

Plantago Bellardi, *All.*
Hill slopes south-west of Turica, in flower, 5-5-17, *Turrill*, 156.
Distr. S. Eur., Orient.
Balkans: Greece, Maced., Alb., Herz.

Plantago Lagopus, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 300.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Thrace.

Plantago lanceolata, *L.*
Paprat District, Krusa Balkan, in fruit, 6-18, *Russell*, 40.
Distr. Most temperate regions.
Balkans: Greece, Maced., Serb., Bulg., Thrace.

AMARANTACEAE.

Amarantus deflexus, *L.*
Krusa Balkan, 6-18, *Harris*, 401; near Kopriva, in flower and fruit, 4-6-17, *Turrill*, 369; near Karamudli, in fruit, 16-7-17, *Turrill*, 506.
Distr. S. Eur., N. Afr.
Balkans: Greece, Maced.

CHENOPODIACEAE.

Chenopodium Botrys, *L.*
In dried up sandy stream bed, west of Karamudli, 16-7-17, *Turrill*, 513.
Distr. S. Eur., N. Afr., Orient, Temp. Asia, N. Amer.
Balkans: General.

Spinacia oleracea, *L.*
Kopriva, female flowers, 12-5-17, probably an escape from cultivation, *Turrill*, 195.

POLYGONACEAE.

Rumex pulcher, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 284; Paprat District, Krusa Balkan, in fruit, 6-18, *Russell*, 89; between Turica and Kopriva, in fruit, 2-6-17, *Turrill*, 362.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Rumex dentatus, *L.*
Hills between Turica and Gumus Dere, flowers and white fruits, 5-6-17, *Turrill*, 383.
Distr. Egypt, Orient.
Balkans: Greece (?).

Rumex multifidus, *L.* (*R. acetoselloides*, Bal.).
Krusa Balkan, in flower, 6-18, *Harris*, 367; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 35.
Distr. Italy, S.-E. Eur., Orient.
Balkans: General.

Polygonum Convolvulus, *L.*
Western end of Krusa Balkan, overlooking Lake Doiran, 1-7-17, *Turrill*, 471.
Distr. Eur., N. Afr., Orient, Temp. Asia, etc.
Balkans: General.

Polygonum pulchellum, *Lois.*
Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 72; southern slopes of Krusa Balkan, near Karamudli, in flower, 12-7-17, *Turrill*, 486.
Distr. France, Italy, Balkans, Armenia.
Balkans: Greece, Maced., Bulg.

ARISTOLOCHIACEAE.

Aristolochia Clematitis, *L.*
The banks of the Struma, near Kopriva Bridge, pure yellow flowers, 19-5-17, *Turrill*, 273.
Distr. Eur., Orient, Cent. Asia.
Balkans: General.

Aristolochia pallida, *Willd.*
Hortac Plateau, about 1,600 ft., 12-14 km. north-east of Salonika, May 2nd, 1917, *Capt. A. J Carid.*
Distr. Cent. and S.-E. Eur., Asia Minor.
Balkans: General, north of Greece.
"The plant grew freely among the scrubby holly oak which abounds there, and also on ground which had been turned (*e.g.*, in making ditches) during the winter."

Aristolochia rotunda, *L.*
Struma Plain and Krusa Balkan, 4 & 5-18, *Harris*, 11; 6 km. north-east of Lahana, in flower, 19-4-17, *Turrill*, 62.
Distr. Cent. and S. Eur.
Balkans: Greece, Maced., Herz.

EUPHORBIACEAE.

Euphorbia thessala, *Form.*
Struma Plain and Krusa Balkan, in flower and fruit, 6-18, *Harris*, 335.
Distr. Thessaly, Maced., Thrace.

Euphorbia Cyparissias, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 169, 261.
Distr. Cent. and S. Eur.
Balkans: General, north of Greece.

Euphorbia Esula, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 79.
Distr. Eur., Orient, Temp. Asia.
Balkans: General.

Euphorbia amygdaloides, *L.*
Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 30.
Distr. Cent. and S. Eur., Orient.
Balkans: Maced., Alb., Mtn., Serb., Corfu, Bulg.

PLATANACEAE.

Platanus orientalis, *L.*
Gumus Dere, 10-17, *Russell.*
Distr. S.-E. Eur., Orient.
Balkans: Greece, Maced., Bulg., Thrace.
The leaves have very cuneate bases.

URTICACEAE.

Urtica pilulifera, *L.*
Hills south-west of Turica, near a ruined village, in fruit, 8-6-17, *Turrill* (seed-number), 41.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Mtn., Thrace.

ULMACEAE.

Ulmus campestris, *L.*
A common tree in the Struma Plain, 22-4-17, *Turrill.*
Distr. Eur., Orient, N. Afr., Temp. Asia.
Balkans: General.

JUGLANDACEAE.

Juglans regia, *L.*
East of Karamudli, in fruit, 9-7-17, *Turrill.*
Distr. S.-E. Eur., Orient, N. India.
Balkans: Greece, Serb., Bulg.

CUPULIFERAE.

Quercus coccifera, *L.*
Foothills to south Turica, in flower, 27-5-17, *Turrill,* 335.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Alb., Mtn., Thrace.
Ripe acorns were gathered near Akbunar, 8 km. north-west of Salonika, in Oct. 1917. The plant seldom becomes more than a low shrub, 1 to 5 ft. in height, but small trees, with the leaves tending to lose their spines, were observed in the village of Turica and at the "Red Farm" near Akbunar. It is the characteristic plant of the "Lembert Hills" north of Salonika.

Quercus conferta, *Kit.*
6 km. north-east of Lahana, 19-4-17, *Turrill,* 68; east of Karamudli, southern slopes of Krusa Balkan, 9-7-17, *Turrill,* 483.
Distr. Italy, S.-E. Eur.
Balkans: Greece, Mtn., Serb., Bulg.
This is the common oak tree of Greek Macedonia.

Carpinus duinensis, *Scop.*
Nullah south of Turica, in fruit, 6-5-17, *Turrill,* 170.
Distr. S.-E. Eur., Asia Minor.
Balkans: General.

SALICACEAE.

Populus alba, *L.*
Ravine between Turica and Kopriva, 29-5-17, *Turrill,* 349.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Salix alba, *L.*
Banks of R. Struma, near Kopriva Bridge, in fruit, 26-5-17, *Turrill,* 329.
Distr. Eur., Orient, N. Afr.
Balkans: General.

BUTOMACEAE.

Butomus umbellatus, *L.*
Near Ormanli, Struma Plain, in flower, 20-5-17, *Turrill*, 278.
Distr. Eur., Asia.
Balkans: General.

*ORCHIDACEAE.

Limodorum abortivum, *Sw.*
Struma Plain and Krusa Balkan, in flower and fruit, 5-6-18, *Harris*, 204, 378; hills between Gumus Dere and Kopriva, 15-5-17, *Turrill*, 215.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Serb., Bulg., Thrace.
Dark purple-green inflorescence and stem with dirty white-purple flowers.

Cephalanthera ensifolia, *Rich.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 57.
Distr. Cent. and S. Eur., N. Afr., Tem. Asia.
Balkans: Greece, Maced., Serb., Bulg.

Cephalanthera pallens, *Rich.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 246.
Distr. Cent. and S. Eur., Orient.
Balkans: Greece, Alb., Serb.

Orchis Morio, *L.*
Struma Plain and Krusa Balkan, in flower, 5 & 6-18, *Harris*, 244, 382; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 21.
Distr. Eur., Orient.
Balkans: Greece, Mtn., Bosnia, Serb., Bulg., Thrace.

Orchis Morio, *L.*, sub-sp. **Skorpili,** *Vel.*
Hills between Turica and Gumus Dere, red flowers, 15-5-17, *Turrill*, 217.
Distr. Bulg.

Orchis coriophora, *L.*
Foothills to south of Turica, in flower, 27-5-17, *Turrill*, 333.
Distr. Cent. and S. Eur., Orient.
Balkans: Greece, Alb., Serb., Bulg.
Lobes of labellum green, upper lip purple.

Orchis tridentata, *Scop.*
Foothills near Turica, pink flowers, 30-4-17, *Turrill*, 132.
Distr. Cent. and S. Eur., Orient.
Balkans: Mtn., Serb., Bulg., Thrace.

Orchis militaris, *L.*
Struma Plain and Krusa Balkan, in flower, 5 & 6-18, *Harris*, 102, 380.
Distr. Cent. and S. Eur., Orient.
Balkans: General.

* Determined by R. A. Rolfe.

Orchis purpurea, *Huds.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 229.
Distr. Cent. Eur., Orient.
Balkans: Thrace.

Orchis palustris, *Jacq.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 42, 87; Struma Plain, near Kopriva Bridge, purple flowers, 19-5-17, *Turrill*, 275.
Distr. Eur., Orient, N. Afr.
Balkans: Greece.

Orchis laxiflora, *Lam.*
Krusa Balkan, in flower, 6-18, *Harris*, 381.
Distr. W. and S. Eur., Orient.
Balkans: Greece, Maced., Mtn., Serb., Bulg., Thrace.

Orchis maculata, *L.*, var. **saccigera,** *Rchb. f.* (*O. saccigera*, Brong., *Q. macedonica*, Griseb.).
Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 42.
Distr. S. Eur., Orient.
Balkans: General.

Orchis provincialis, *Balb.*
Krusa Balkan, in flower, 6-18, *Harris*, 379.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Thrace.

Orchis papilionacea, *L.*
Krusa Balkan, in flower, 5 & 6-18; *Harris*, 58, 408; foothills between Turica and Kopriva, pink flowers, 14-5-17, *Turrill*, 206.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece, Mtn., Serb., Thrace.

Orchis pyramidalis, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 63; Paprat District, Krusa Balkan, in flower, 6-18, *Russell*, 73; foothills between Turica and Kopriva, flowers entirely pink, 14-5-17, *Turrill*, 203.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece, Serb., Bulg., Thrace.

Orchis hircina, *Crantz.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 56; hills west by south of Kopriva, in flower, 15-5-17, *Turrill*, 243.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece, Serb., Bulg., Thrace.

Ophrys apifera, *Huds.*
Foothills near Turica, 24-5-17, *Turrill*, 295.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece, Serb.

Ophrys atrata, *Lindl.*
Struma Plain and Krusa Balkan, in flower, 4 to 6-18, *Harris*, 19, 100, 228, 400; near Gumus Dere, in flower, 5-18, *Russell*, 5, 6.
Distr. S. Eur., Asia Minor.
Balkans: Greece, Maced., Bulg.

Ophrys cornuta, *Stev.*
Struma Plain and Krusa Balkan, in flower, 4 to 6-18, *Harris*, 40.
Distr. S.-E. Eur., Transcaucasus.
Balkans: Greece, Maced., Herz., Bulg., Thrace.

Spiranthes autumnalis, *Rich.*
Krusa Balkan, in flower, 6-18, *Harris*, 417.
Distr. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Thrace.

IRIDACEAE.

Iris Pseudacorus, *L.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 25; banks of R. Struma, near Kopriva Bridge, in flower, 19-5-17, *Turrill*, 269.
Distr. Eur., N. Afr.
Balkans: Greece, Serb., Bulg., Thrace.

Iris Reichenbachii, *Heuffel.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 154.
Distr. S. Hungary, Balkans, north of Greece.
This is the purple form which = *I. balkana*, Janka. See Dykes, "The Genus Iris," p. 152.

Romulea Bulbocodium, *S. et M.*
8-10 km. north of Salonika, in flower, 5-2-17, *Turrill*, 8.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Thrace.

Gladiolus illyricus, *Koch.*
Struma Plain and Krusa Balkan, in flower and fruit, 4 & 5-18, *Harris*, 40, 278.
Distr. Eur., N. Afr., Orient.
Balkans: General.

Crocus Boryi, *Gay.*
Krusa Balkan, in flower, 6 & 7-18 (?), *Harris*, 418.
Distr. Greece.

Crocus pulchellus, *Herb.*
Near Gumus Dere, 10-17, *Russell.*
Distr. Thessaly, Maced., Thrace, Bithynia.

AMARYLLIDACEAE.

Leucojum aestivum, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 311.
Distr. Cent. and S. Eur., Orient.
Balkans: General north of Greece.

Asparagus acutifolius, *L.*
Common amongst bushes of *Quercus coccifera*, 8-10 km. north of Salonika, 3-17, *Turrill.*
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Thrace.

Polygonatum latifolium, *Desf.*
Krusa Balkan, in flower, 6-18, *Harris*, 354.
Distr. S.-E. Eur., Temp. Asia.
Balkans: Mtn., Bulg.

Anthericum Liliago, *L.*
Krusa Balkan, in flower, 6-18, *Harris*, 347.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Thessaly, Serb., Bulg.

Asphodelus albus, *Willd.*
Near Gumus Dere, in flower, 5-18, *Russell*, 3; 6 km. north-east of Lahana, in flower, 19-4-17, *Turrill*, 69.
Distr. S. Eur.
Balkans: Thessaly, Maced., Mtn., Herz., Bosnia, Serb., Bulg.
Grows to 5 or 6 ft. in height.

Asphodeline liburnica, *Reichb.*
Krusa Balkan, in flower, 6-18, *Harris*, 405.
Distr. Italy, S.-E. Eur., Orient.
Balkans: General.

Lilium candidum, *L.*
Struma Plain and Krusa Balkan, in flower, 6-18, *Harris*, 415.
Distr. S. Eur., Orient.
Balkans: Greece (native?), Thrace.
This is apparently the wild form of *L. candidum*. It is more slender in habit than any specimen in the Kew Herbarium. The lower leaves are linear to linear-lanceolate, up to 7·5 cm. long and 0·5 cm. broad. Cataphyllary leaves are present on the whole length of the stem. The inflorescence consists of 3 flowers. The perianth segments are 4·5-5 cm. long in the dried specimens. The stamens are 2·7 cm. long, including the anthers, which are 6-7 mm. in length.

Fritillaria pontica, *Wahlenb.*
Krusa Balkan, in flower, 6-18, *Harris*, 236.
Distr. Maced., Bulg., Thrace, Asia Minor.

Tulipa australis, *Link.*
Struma Plain and Krusa Balkan, yellow flowers, 5-18, *Harris*, 263.
Distr. Cent. and S. Eur.
Balkans: Greece.

Gagea stenopetala, *Reichb.*
8-10 km. north of Salonika, in flower, 5-2-17, *Turrill*, 9.
Distr. Cent. and S. Eur.
Balkans: General.

Ornithogalum narbonense, *L.*
Between Kurkut and Alexsia, in flower, 15-6-17, *Turrill*, 412.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Bulg., Serb., Thrace.

Ornithogalum nutans, *L.*
Struma Plain and Krusa Balkan, in flower, 5 & 6-18, *Harris*, 62.
Distr. Cent. and S. Eur., Orient.
Balkans: Greece.

Ornithogalum tenuifolium, *Guss.*
Struma Plain, about 4 km. south-east of Orljak, in flower, 20-4-17, *Turrill*, 73.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Mtn., Serb.

Ornithogalum fimbriatum, *Willd.*
8-10 km. north of Salonika, in flower, 13-4-17, *Turrill*, 52.
Distr. S.-E. Eur., Orient.
Balkans: Greece, Thrace.
This plant has conspicuously hairy leaves and peduncles.

Scilla bifolia, *L.*
Near Gumus Dere, 4-18, *Russell*, 13.
Distr. Cent. and S. Eur., Orient.
Balkans: Greece, Maced., Serb., Bulg., Thrace.

Scilla autumnalis, *L.*
Akbunar, 9 km. north-west of Salonika, in flower, 10-17, *Turrill*, 548.
Distr. Eur., Orient.
Balkans: Greece, Maced., Serb., Bulg., Thrace.

Muscari comosum, *Mill.*
Struma Plain and Krusa Balkan, young fruit, 4 & 5-18, *Harris*. 49; Paprat District, Krusa Balkan, in fruit, 6-18, *Russell*, 36; Struma Plain, about 2 km. south-east of Orljak, in flower, 26-4-17, *Turrill*, 105.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece, Mtn., Serb., Bulg., Thrace.
This is one of the most conspicuous of the spring plants in the Struma Plain.

Muscari racemosum, *L.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 125.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Muscari pyramidatum, *Vel.*
Near Gumus Dere, 4-18, *Russell*, 10.
Distr. Bulg.

Allium rotundum, *L.*
Uladaja Ravine, on hill-side, 20-6-17, *Baker*, 20; foothills between Turica and Kopriva, deep red flowers, 14-5-17, *Turrill*, 204.
Distr. Cent. and S. Eur., Orient.
Balkan: Greece, Serb., Bulg., Thrace.

Allium sphaerocephalum, *L.*
Uladaja Ravine, on hill-side, in flower, 20-6-17, *Baker*, 20; southern slopes of Krusa Balkan, north of Karamudli, deep red flowers, 8-7-17, *Turrill*, 478.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Allium pulchellum, *Don.*
Krusa Balkan, in flower, 6-18, *Harris*, 412; southern slopes of Krusa Balkan, north of Karamudli, pink flowers, 16-6-17, *Turrill*, 415.
Distr. S. Eur., N. Afr., Orient.
Balkans: Mtn., Bulg.

Allium nigrum, *L.*
Struma Plain and Krusa Balkan, in flower and young fruit, 4 & 5-18, *Harris*, 61.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Serb.

Allium margaritaceum, *S. et S.*
Southern slopes of Krusa Balkan, west of Karamudli, white flowers, 16-7-17, *Turrill*, 510.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

JUNCACEAE.

Juncus glaucus, *Ehrh.*
Near Snevce, 24-7-17, *Turrill*, 534.
Distr. Eur., Asia, Afr.
Balkans: General.

Juncus acutiflorus, *Ehrh.*
Near Trinity Well, south-west of Turica, 7-6-17, *Turrill*, 392; side of R. Spanc, near Snevce, 17-7-17, *Turrill*, 516.
Distr. W., Cent. and S. Eur.
Balkans: General.

Juncus bufonius, *L.*
Near Ormanli, Struma Plain, 20-5-17; *Turrill*, 286; Struma Plain between Kopriva and Kopriva Bridge, 26-5-17, a form with the florets approximated into heads (=*J. hybridus*, Brot., *J. insularis*, Viv.), *Turrill*, 331.
Distr. Nearly cosmopolitan.
Balkans: Probably general.

Luzula Forsteri, *DC.*
6 km. north-east of Lahana, amongst bushes in a nullah, 19-4-17, *Turrill*, 66.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Mtn., Serb., Bulg., Thrace.

Luzula campestris, *DC.*
6 km. north-east of Lahana, 19-4-17, *Turrill*, 58.
Distr. Most temperate regions.
Balkans: General.

ARACEAE.

Dracunculus vulgaris, *Schott.*
Struma Plain and Krusa Balkan, in flower, 5-18, *Harris*, 257.
Distr. S. Eur., Asia Minor.
Balkans: Greece, Maced., Mtn., Thrace.

CYPERACEAE.

Carex divisa, *Huds.*
Nullahs south of Turica, in the hills, 6-5-17, *Turrill*, 172; Struma Plain, near Ormanli, 20-5-17, *Turrill*, 280.
Distr. Eur., N. and S. Afr., Orient.
Balkans: Greece, Mtn., Herz., Serb., Bulg., Thrace.

Carex muricata, *L.*
8-10 km. north of Salonika, 13-4-17, *Turrill*, 45.
Distr. Eur. and Orient.
Balkans: Greece, Mtn., Serb., Bulg.

Carex divulsa, *Good.*
Foothills near Turica, 8-5-17, *Turrill*, 188.
Distr. Eur., N. Afr., Orient.
Balkans: Greece, Mtn., Serb., Bulg., Thrace.

Carex praecox, *Jacq.*
6 km. north-east of Lahana, 19-4-17, *Turrill*, 71; foothills near Turica, 30-4-17, *Turrill*, 118.
Distr. Eur., Orient, Cent. and N. Asia, N. Amer.
Balkans: Greece, Maced., Serb., Bulg., Thrace.

Carex flacca, *Schreb.*
Struma Plain and Krusa Balkan, in flower, 4 & 5-18, *Harris*, 116.
Distr. Eur., N. Afr., Orient.
Balkans: General.

Carex flacca, *Schreb.*, var. **cuspidata,** *Aschers. et Graebn.*
Foothills near Turica, 3-5-17, *Turrill*, 146.
Distr. (of var.) S. Eur., N. Afr., Orient.
Balkans: Greece, Maced.

Carex flacca, *Schreb.* var. **pubicarpa,** *Rohl.*
6 km. north-east of Lahana, 19-4-17, *Turrill*, 63; foothills near Turica, 30-4-17, *Turrill*, 119.
Distr. Apparently only recorded previously from Montenegro.

Carex extensa, *Good.*
Struma Plain near Ormanli, 20-5-17, *Turrill*, 281.
Distr. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Alb.

Carex ventricosa, *Curt.*
Foothills near Turica, 3-5-17, *Turrill*, 143.
Distr. W. and S. Eur.
Balkans: Greece.

Scirpus maritimus, *L.*
Near the R. Struma, Kopriva Bridge, 19-5-17, *Turrill*, 271.
Distr. Cosmopolitan.
Balkans: General.

Scirpus Holoschoenus, *L.*
Near the R. Struma, Kopriva Bridge, 19-5-17, *Turrill*, 272.
Distr. Cent. and S. Eur., N. Afr., Orient, N. Asia.
Balkans: Greece, Maced., Serb., Bulg., Thrace.

Cyperus rotundus, *L.*
Near Ormanli, Struma Plain, 20-5-17, *Turrill*, 279.
Distr. Most warm countries, including those of the Mediterranean region.
Balkans: Greece, Bulg.

Cyperus longus, *L.*
Growing to 5 ft. in height, near the stream at Trinity Well, south-west of Turica, 7-6-17, *Turrill*, 391.
Distr. Most warm countries, including those of the Mediterranean region.
Balkans: Greece, Maced., Serb., Bulg., Thrace.

GRAMINEAE.

Sorghum halepense, *Pers.*
Big clumps to 4 ft. in height, Kopriva, 4-6-17, *Turrill*, 368; south of Karamudli, 13-7-17, *Turrill*, 490.
Distr. Native or introduced in most warm countries.
Balkans: General.

Chrysopogon Gryllus, *Trin.*
Hills between Gumus Dere and Turica, to 4 ft. in height, 15-5-17, *Turrill*, 214.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Setaria viridis, *P. Beauv.*
Near Baisili, at top of Krusa Balkan, 24-6-17, *Turrill*, 439; nullahs to south of Karamudli, 29-6-17, *Turrill*, 456.
Distr. Cent. and S. Eur., Orient, N. Afr., and introduced in many warm parts of the world.
Balkans: General.

Echinochloa Crus-galli, *P. Beauv.*
Near Alexsia, 24-7-17, *Turrill*, 526.
Distr. Most warm parts of the world.
Balkans: General.

Tragus racemosus, *Hall.*
Southern slopes of Krusa Balkan, north of Karamudli, 10-7-17, *Turrill*, 485.
Distr. Cent. and S. Eur., Orient, India, Africa.
Balkans: Greece, Serb., Bulg.

Cynodon Dactylon, *Pers.*
Near Trinity Well, south-west of Turica, 7-6-17, *Turrill*, 389.
Distr. Cent. and S. Eur., and most warm countries.
Balkans: General.
This is one of the commonest plants on the slopes north of Salonika. It comes up in the hardest ground of the camps around and even in the tents. With its long and creeping rhizomes it seems indestructible.

Anthoxanthum odoratum, *L.*
Paprat District, Krusa Balkan, 6-18, *Russell*, 46.
Distr. Eur., N. Afr., Orient, Temp. Asia.
Balkans: General.

Mibora minima, *Desf.*
Struma Plain, about 2 km. east of Orljak, 23-4-17, *Turrill*, 97.
Distr. W. and S. Eur., N. Afr., Orient.
Balkans: Greece.

Phalaris arundinacea, *L.*
Banks of R. Struma, near Kopriva Bridge, 19-5-17, *Turrill*, 268.
Distr. Eur., Orient, Temp. Asia, N. Amer.
Balkans: General.

Alopecurus agrestis, *L.*
Struma Plain, about 2 km. east of Orljak, 26-4-17, *Turrill*, 99.
Distr. Cent. and S. Eur., N. Afr., Orient, Temp. Asia.
Balkans: General.

Alopecurus utriculatus, *Pers.*
8-10 km. north of Salonika, 13-4-17, *Turrill*, 20; Struma Plain, about 3 km. east of Orljak, 20-4-17, *Turrill*, 77.
Distr. S. and W. Eur., N. Afr., Asia Minor.
Balkans: General.

Echinaria capitata, *Desf.*
8-10 km. north of Salonika, 13-4-17, *Turrill*, 18.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

Cynosurus echinatus, *L.*
Foothills between Turica and Kopriva, 23-5-17, *Turrill*, 290; seeds collected north of Karamudli, 29-6-17, flowered at Kew, 5-7-18, *Turrill* (seed-number), 60.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

Agrostis verticillata, *Vill.*
Side of stream, near Trinity Well, south-west of Turica, 7-6-17, *Turrill*, 390; nullahs to south of Karamudli, 15-7-17, *Turrill*, 500.
Distr. S. Eur., N. Afr., Orient, Amer.
Balkans: General.

Agrostis vulgaris, *With.*
Paprat District, Krusa Balkan, 6-18, *Russell*, 33; southern slopes of Krusa Balkan, near Karamduli, 25-6-17, *Turrill*, 441; nullahs to south of Karamudli, 15-7-17, *Turrill*, 504.
Distr. Eur., Orient, N. Amer.
Balkans: General.

Apera Spica-venti, *P. Beauv.*
Southern slopes of Krusa Balkan, near Karamudli, 18-6-17, *Turrill*, 417.
Distr. Eur. (except parts of south), Temp. Asia.
Balkans: General, from Thessaly northwards.

Polypogon monspeliensis, *L.*
Struma Plain, between Kopriva and Kopriva Bridge, 26-5-17, *Turrill*, 330.
Distr. W. and S. Eur., N. and S. Afr., Orient, N. Amer., etc.
Balkans: General.

Gastridium lendigerum, *Gaud.*
Sarigol, near Kukus, 8-17, *Turrill*, 545.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Mtn.

Milium vernale, *M. B.*
Struma Plain, about 3 km. north-east of Orljak, 20-4-17, *Turrill*, 80.
Distr. S.-E. Eur., Orient.
Balkans: General.

Aira capillaris, *Host.*
Struma Plain and Krusa Balkan, 5-18, *Harris*, 174; hill-slopes south-west of Turica, *Turrill*, 165.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

Holcus lanatus, *L.*
Near Karamudli, 21-6-17, *Turrill*.
Distr. Eur., N. Afr., Orient, Temp. Asia, N. Amer.
Balkans: General.

Avena barbata, *Brot.*
Foothills between Turica and Kopriva, 30-4-17, *Turrill*, 129.
Distr. W. and S. Eur., Orient.
Balkans: Greece, Maced.

Trisetum myrianthum, *Parl.*
Foothills between Turica and Kopriva, 24-5-17, *Turrill*, 302.
Distr. Italy, Greece, Alb., Mtn., Herz., Thrace.

Koeleria gracilis, *Pers.*
Foothills between Turica and Kopriva, 18-5-17, *Turrill*, 261.
Distr. Cent. and S. Eur., Orient, etc.
Balkans: General.

Koeleria phleoides, *Pers.*
Hill slopes south-west of Turica, 5-5-17, *Turrill*, 167.
Distr. W. and S. Eur., N. Afr., Orient, etc.
Balkans: Greece, Maced., Mtn., Herz., Bulg., Thrace.

Melica ciliata, *L.*
Between Turica and Kopriva, 12-5-17, *Turrill*, 197; between Turica and Kopriva, 2-6-17, *Turrill*, 365; seeds collected west of Karamudli, 9-7-17, *Turrill* (seed-number), 71.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Dactylis glomerata, *L.*, var. **hispanica,** *Roth.*
Paprat District, Krusa Balkan, 6-18, *Russell*, 38.
Distr. (of var.). S. Eur., Orient.
Balkans: Greece, Maced.

Vulpia Myurus, *L.*
Paprat District, Krusa Balkan, 6-18, *Russell*, 61; near Turica, 24-5-17, *Turrill*, 300.
Distr. Cent. and S. Eur., N. Afr., Orient, etc.
Balkans: General.

Bromus maximus, *Desf.*
Hill slopes south-west of Turica, 5-5-17, *Turrill*, 159.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Mtn., Thrace.

Bromus sterilis, *L.*
Foothills near Turica, 4-5-17, *Turrill*, 152.
Distr. Eur., Orient, N. Afr., Temp. Asia.
Balkans: General.

Bromus tectorum, L.
Near Turica, 8-5-17, *Turrill*, 187.
Distr. Eur., N. Afr., Orient, Temp. Asia.
Balkans: General.

Bromus scoparius, *L.*
Foothills between Orljak and Turica, 29-4-17, *Turrill*, 113.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Serb., Bulg., Thrace.

Bromus squarrosus, *L.*
Paprat District, Krusa Balkan, 6-18, *Russell*, 48; hills west by south of Kopriva, 15-5-17, *Turrill*, 220; near Trinity Well, south-west of Turica, 7-6-17, *Turrill*, 388.
Distr. S. Eur., N. Afr., Orient, Temp. Asia.
Balkans: General.
One of the panicles of *Turrill*, 220, is the variety **villosus,** *Gmel.*, the rest have glabrous spikelets. *Turrill*, 388, is a fine luxuriant form with large panicles and spikelets.

Bromus hordeaceus, *L.*
Between Turica and Kopriva, 21-5-17, *Turrill*, 283.
Distr. Eur., N. Afr., Orient.
Balkans: General.

Bromus commutatus, *Schrad.*
Foothills between Turica and Kopriva, 2-6-17, *Turrill*, 364.
Distr. Cent. and S. Eur., N. Afr., Orient.
Balkans: General.

Bromus arvensis, *L.*
Paprat District, Krusa Balkan, 6-18, *Russell*, 45; top of Krusa Balkan, near Baisili, 24-6-17, *Turrill*, 437.
Distr. Cent. and S. Eur., Orient, Temp. Asia.
Balkans: General.
One of the specimens of *Turrill*, 437, is the typical form of the species, the glumes being glabrous, or apparently so, when seen with a hand-lens. The second specimen has the glumes covered with dense white hairs, and is apparently the variety **seriostachys** *Hal.* (= var. *velutinus*, Duv.-Jouv. non *B. velutinus*, Schrad.), which is recorded from Thessaly.

Festuca ovina, *L.*, var. **valesiaca,** *Schleich.*
Foothills between Turica and Kopriva, 24-5-17, *Turrill*, 303.
Distr. (of var.). Cent. and S.-E. Eur., W. Asia, etc.
Balkans: Probably general.

Glyceria plicata, *Fries.*
Side of R. Spanc, south of Snevce, 17-7-17, *Turrill*, 515.
Distr. Cent. and S. Eur., N. Afr., Amer.
Balkans: General.

Scleropoa rigida, *Griseb.*
On dry banks near Turica, 24-5-17, *Turrill*, 308.
Distr. W. and S. Eur., Orient,
Balkans: Greece, Maced., Mtn., Thrace.

Briza maxima, *L.*
Hill slopes south-west of Turica, 5-5-17, *Turrill*, 163; fruits collected on southern slopes of Krusa Balkan, near Karamudli, 20-6-17, flowered at Kew, 5-7-18, *Turrill* (seed number), 52.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece, Maced., Mtn., Bosnia, Herz.

Poa trivialis, *L.*
Paprat District, Krusa Balkan, 6-18, *Russell*, 49.
Distr. Eur., Temp. Asia.
Balkans: Greece, Maced., Thrace.

Poa nemoralis, *L.*
Nullahs to south of Karamudli, 15-7-17, *Turrill*, 501.
Distr. Eur., Orient, Temp. Asia, N. Amer.
Balkans: General.

Poa bulbosa, *L.*
Struma Plain and Krusa Balkan, 4 & 5-18, *Harris*, 75; 8-10 km. north of Salonika, 13-4-17, *Turrill*, 51.
Distr. Eur., N. Afr., Temp. Asia.
Balkans: General.

Poa concinna, *Gaud.*
8-10 km. north of Salonika, 13-4-17, *Turrill*, 36.
Distr. Cent. and S.-E. Eur.
Balkans: General.

Elymus crinitus, *Schreb.*
Between Turica and Kopriva, 17-5-17, *Turrill*, 256; near Trinity Well, south-west of Turica, 7-6-17, *Turrill*, 393.
Distr. S.-E. Eur., Taurus.
Balkans: General.

Hordeum leporinum, *Link.*
Between Turica and Kopriva, 12-5-17, *Turrill*, 198.
Distr. S. Eur.
Balkans: General.

Aegilops ovata, *L.*
Between Turica and Kopriva, 17-5-17, *Turrill*, 250.
Distr. S. Eur., Orient.
Balkans: General.

Aegilops triaristata, *Willd.*
Near Turica, 12-5-17, *Turrill*, 200; fruits collected on southern slopes of Krusa Balkan, north of Karamudli, 29-6-17, flowered at Kew, 15-6-18, *Turrill* (seed number), 59.
Distr. S. Eur., Orient.
Balkans: General.

Aegilops triuncialis, *L.*
Near Turica, 3-5-17, *Turrill*, 147; between Turica and Kopriva, 17-5-17, *Turrill*, 260.
Distr. S. Eur., Orient, N. Afr.
Balkans: General.

Brachypodium pinnatum, *P. Beauv.*
Nullahs to south of Karamudli, 29-6-17, *Turrill*, 455.
Distr. Eur., Orient, N. Afr., Temp. Asia.
Balkans: General.

Brachypodium sylvaticum, *R. et S.*
Paprat District, Krusa Balkan, 6-18, *Russell*, 47.
Distr. Eur., N. Afr., Orient, Temp. Asia.
Balkans: General.

Brachypodium distachyum, *R. et S.*
Between Turica and Kopriva, 21-5-17, *Turrill*, 284.
Distr. Eur., N. Afr., Orient.
Balkans: Greece, Mtn., Thrace.

Lolium temulentum, *L.*
Hills between Turica and Gumus Dere, 25-5-17, *Turrill*, 315; southern slopes of Krusa Balkan, north of Karamudli, 16-6-17, *Turrill*, 416.
Distr. Eur., N. Afr., Orient, Temp. Asia.
Balkans: General.

Haynaldia villosa, *Schur.*
Between Turica and Kopriva, 12-5-17, *Turrill*, 199.
Distr. S. Eur., N. Afr., Orient.
Balkans: Greece.

Psilurus aristatus, *Duv.-Jouv.*
Foothills to south of Turica, 27-5-17, *Turrill*, 344.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

CONIFERAE.

Juniperus Oxycedrus, *L.*
Northern foothills of Krusa Balkan, to the south of Turica, in fruit, 27-5-17, *Turrill*, 336.
Distr. S. Eur., N. Afr., Orient.
Balkans: General.

FILICES.

Pteris aquilina,
Common round base and on top of Krusa Balkan, near Karamudli, 6-17, *Turrill.*
Distr. Cosmopolitan.

Asplenium Trichomanes, *L.*
Struma Plain and Krusa Balkan, 4 & 5-18, *Harris*, 10; near Gumus Dere, 4-18, *Russell*, 14; nullah in hills to south of Turica, 6-5-17, *Turrill*, 176.
Distr. Temp. and sub-trop. regions.
Balkans: General.

Asplenium Adiantum-nigrum, *L.*, var. **acutum,** *Borg.*
Nullah in the hills to the south of Turica, 6-5-17, *Turrill*, 176a.
Distr. Eur.
Balkans: General.

Adiantum Capillus-Veneris, *L.*

Nullah in the hills to the south of Turica, 6-5-17, *Turrill*, 175; nullah west of Karamudli, 4-7-17, *Turrill*, 473.

Distr. Nearly cosmopolitan.

Balkans: Greece, Maced.

Ceterach officinarum, *Willd.*

Struma Plain and Krusa Balkan, 4 & 5-18, *Harris*, 9; 6 km. north-east of Lahana, 19-4-17, *Turrill*, 59.

Distr. Eur., N. Afr., Orient, Himalayas.

Balkans: Greece, Alb., Serb., Bulg.

Geographical Distribution.

Since the present paper only records 625 species and varieties of plants from Macedonia, probably about a quarter of the entire vascular vegetation, care is needed in drawing any general conclusions from it. Nevertheless, several interesting facts become clear when the distribution of the recorded plants is considered. Of the plants given in the list 228 are widely distributed in Europe and the Orient; 198 extend throughout the Mediterranean regions of South Europe, North Africa, and the Orient; 82 are limited to the Eastern Mediterranean, and may be termed the Oriental element in our flora, most often they occur only in the Balkans and Asia Minor, but sometimes reach Italy and have a wider distribution in Western Asia and Northern Africa; 21 occur in South-East Europe and often in Central Europe, but do not extend into Asia Minor; 36 are endemic in Macedonia and its immediate neighbours; 8 are endemic in the Balkans, but have a wider distribution than the last within the Peninsula. It is evident that the flora is predominantly Mediterranean and is most closely related to the Grecian Flora. Thus 105 species are common to Macedonia and Greece, but do not extend northwards into Bulgaria. Nevertheless, as one would expect from its geographical position, Macedonia links floristically Greece and Bulgaria, and the northern element is distinctly marked since 38 plants are recorded in our list which occur in Macedonia and Bulgaria, but not in Greece. An interesting feature about many of the endemics is that they are numerous in individuals and give a real facies to the vegetation.

The distribution of the following plants is peculiar or worthy of special mention:—

Nigella elata was previously known only from Asia Minor.

Dianthus leptopetalus is recorded from Macedonia, Thrace, S. Russia and the Caucasus, but from neither Greece nor Bulgaria.

Orobus atropurpureus has a limited distribution in S. Italy, Sicily and N. Africa, but no record of its discovery in the Balkans has been found.

Rubus collinus has apparently not been previously recorded from the Balkans, although it is known from many Mediterranean countries.

Scabiosa sicula is known from Thrace, but not from Continental

Greece or Bulgaria, although it is widely spread both east and west of the Balkan Peninsula.

Carduus pycnocephalus var. *cinereus* was only known from the Caucasus and Transcaucasus.

Centaurea pullata was recorded only from Portugal, Spain, S. France and Egypt.

Convolvulus tricolor has not previously been recorded east of Dalmatia except for a doubtful record from Bithynia. It is common 8-10 km. north of Salonika.

Anagallis platyphylla is a native of Algeria and Morocco, and was possibly introduced with army fodder.

Orchis purpurea has only been recorded previously from Thrace in the Balkans.

Carex flacca var. *pubicarpa* was described from Montenegro, but has probably a wider distribution in South-East Europe.

XXXIII.—MISCELLANEOUS NOTES.

J. H. Lace, C.I.E., F.L.S.—A frequent visitor to the Kew Herbarium, and one held in very high regard by the members of the staff there, passed away in June last at his home at Exmouth, Devonshire. John Henry Lace was trained for the Indian Forest Department at the National Forest School at Nancy, France, and passed out in 1881. On arrival in India he was appointed to the Punjab, and soon made a name for himself as a keen forest officer and accurate botanist. During his service of over thirty years he served not only in the Punjab but in British Baluchistan, Bengal, and Burma. While in Baluchistan he made an extensive collection of plants which resulted in the publication of "A Sketch of the Vegetation of British Baluchistan" by himself and Mr. Hemsley in Journ. Linn. Soc. xxviii. (1891) p. 288. At one time he was Assistant Inspector-General of Forests, at another he was for a short while Principal of the Forest College at Dehra Dún, and again he once officiated as Inspector-General of Forests. His last appointment was that of Chief Conservator of Forests in Burma, which he held for about five years, doing excellent work not only in forest management but in the study of the flora of some of the less-known regions, such as the Shan States and the hills around Maymyo. His useful and accurate "List of the Trees, Shrubs, and Climbers of Burma" is the present standard work on the subject, and the beautifully prepared specimens collected by him are of the greatest value to Indian botanists. He presented a nearly complete set of his collections to the Kew Herbarium, and we are glad to hear that his own set has now become the property of the Herbarium of the Royal Botanic Garden at Edinburgh. Many new species found by him in the Burma forests have been described in the Kew "Decades" from time to time, chiefly by himself. His death at the age of over sixty years was rather sudden, and came as a shock to his many friends at home.

J. S. G.

E. J. Allard.—We record with regret the death of Mr. Edgar John Allard, Superintendent of the John Innes Horticultural Institution, Merton, which occurred on October 23rd from pneumonia following influenza.

Mr. Allard entered Kew as a young gardener in June, 1898, having received his earlier training in several nurseries and at the Cambridge Botanic Garden. He left Kew in August, 1899, to return to the Botanic Garden, Cambridge, on his selection to fill the post of foreman, and remained there until his appointment as the first Superintendent at Merton under Mr. W. Bateson.

In all the posts he filled Mr. Allard proved himself a man of conspicuous ability, and acquired that interest in and knowledge of the scientific side of horticulture which rendered all the work he did of so much value.

Added to his skill as a gardener he had a charming personality, and it was to this, as well as to his interest in his fellow-men, that his good influence with the young men and boys who came under him must be attributed.

Lady Barkly's Drawings of Orchids.—The Bentham Trustees have purchased from a London bookseller and presented to the Herbarium a collection of coloured drawings of plants comprising 51 drawings of orchids, native of British Guiana, 7 of orchids indigenous or cultivated in Jamaica, one of *Peristeria elata*, from Panama, and a drawing of *Psychotria corymbosa*, Swartz, marked "Highgate, June, 1854," and 66 of Cape plants belonging to numerous genera, including a few of Orchidaceae. The drawings of British Guiana orchids are mounted in a large folio volume, at the beginning of which is a printed inscription from which we learn that they were made from nature by Mrs. Barkly, and, from the dates written beneath the drawings, that they were made between 1850 and 1852. Many of these are localised and in many instances are named, some few, however, incorrectly, while several bear no inscription of any kind. Though unsigned, the drawings made in Jamaica are evidently by the same artist, Mrs. (afterwards Lady) Barkly, the first wife of Sir Henry Barkly, G.C.M.G., K.C.B., F.R.S., whose invaluable services to Kew and to botany are recorded in the prefaces to the "Flora Capensis," vol. iv. sect. 1, and vol. vi. The colouring of the flowers in these drawings is good, but the leaves are usually represented somewhat too yellow. As a whole they possess considerable merit and are a valuable addition to the Kew collection. Of especial interest are two which illustrate the female forms of *Cycnoches Loddigesii* and an undetermined species of *Catasetum*. Lady Barkly lived in British Guiana, where Sir Henry was Governor, from 1848 to 1853, and in Jamaica, whither her husband was transferred, from 1853 to 1856. She accompanied Sir Henry to Melbourne on his appointment to the Governorship of Victoria at the close of 1856, and died there on April 17th, 1857.

The drawings of Cape plants are, with very few exceptions, by Miss E. B. Barkly, daughter of Sir Henry by his first wife. Many of them, however, do not bear the artist's initials and are unnamed and unlocalised. S. A. S.

Botanical Magazine.—The following plants are figured in the number for July, August, and September:—*Sophora japonica*, Linn. (t. 8764), a native of China; *Ramondia serbica*, Pancic (t. 8765), from the Balkan Peninsula; *Gongora latisepala*, Rolfe (t. 8766), probably from Colombia; *Rhododendron argyrophyllum*, var. *leiandrum*, Hutchinson (t. 8767), from Western Szechuan; *Govenia tingens*, Poepp. & Endl. (t. 8768), a native of Peru; *Linum elegans*, Sprunner ex Boiss. (t. 8769), from Greece; *Alnus firma*, var. *Yasha*, Winkler (t. 8770), from Japan; *Stewartia serrata*, Maxim. (t. 8771), from Japan; *Polystachya Pobeguinii*, Rolfe (t. 8772), from Tropical Africa; *Hypericum laeve*, Boiss. & Haussk. forma *rubra* (t. 8773), a native of Northern Syria and Kurdistan; and *Scabiosa Hookeri*, C. B. Clarke (t. 8774), from the Eastern Himalaya and Western China.

The number for October, November, and December contains figures of the following plants:—*Rhododendron orbiculare*, Decne (t. 8775), a native of Western Szechuan; *Mesembryanthemum fulviceps*, N. E. Br. (t. 8776A), and *M. Elishae*, N. E. Br. (t. 8776B), both from South Africa; *Primula sinopurpurea*, Balf. f. (t. 8777), from Yunnan; *Stewartia sinensis*, Rehd. & Wils. (t. 8778), from Western China; *Cereus Tunilla*, Weber (t. 8779), a native of Costa Rica; *Odontoglossum praevisum*, Rolfe (t. 8780), from Colombia; *Berberis Beaniana*, Schneider (t. 8781), from Western Szechuan; *Diascia Aliciae*, Hiern (t. 8782), from South Africa; *Mesembryanthemum edule*, Linn. (t. 8783), from South Africa; *Rhododendron oreotrephes*, W. W. Sm. (t. 8784), a native of Yunnan, and *Bulbophyllum Hamelinii*, Rolfe (t. 8785), from Madagascar.

Stevia Rebaudiana.—A reference to this plant as "the sweetest plant in the world" has recently appeared in the gardening press. It is a native of Paraguay, and was originally described as *Eupatorium Rebaudianum* by Dr. Bertoni. A considerable amount of information is given concerning it in the *Kew Bulletin*, 1901, p. 173, and it was figured in "Hooker's Icones Plantarum," t. 2816 (1906), where Dr. Hemsley transferred it to the genus *Stevia*.

A recent account of the plant together with details of analyses has been published by Dr. Bertoni in "Anales Cientificos Paraguayos," Jan., 1918. A summary of this paper is given in the West Indian "Agricultural News," xvii. No. 423, July 13th, 1918, p. 213, and from this and from Wehmer, "Pflanzenstoffe Phanerog.," p. 712, the following information has been extracted. The principal sweetening substances are a glucoside, eupatorin, or estevin, and its tripotassic and sodic salt, rebaudin. Both these substances are said to taste 150-180 times as sweet as sugar. The glucoside is obtained as a red crystalline substance with the probable formula $C_{42}H_{72}O_{21}$. The leaves also contain resins, tannic acid, wax, and a little oil.

The importance of the product of this plant is chiefly in its quality as a possible substitute for saccharine, over which it is claimed to have the folowing advantages:—

1. In not having any toxic effect, but being, on the contrary, wholesome.

2. In having greater sweetening powers.

3. In being capable of being employed just as it is found in its natural state, by using the leaves crushed to powder.

4. In the fact that it could be put on the market at a much lower price than saccharine.

The glucoside, which is the principal sweetening substance, should be known by the name of estevin, rather than by that of eupatorin, for the latter name has been applied to a bitter substance extracted from *Eupatorium perfoliatum*. The sweetening power of the dried leaf is said to be 40 to 45 times superior to that of any other known natural substance, and it contains no other active principle or harmful substance. The bitter aromatic resin has, on the contrary, a tonic effect on the digestive organs. As a nutrient, of course, the leaves could not replace sugar. Another advantage which the leaves possess is that they may be preserved dry without deterioration for an indefinite period. It is suggested that if cuttings or seeds could be obtained it would be interesting and perhaps profitable to make trial of the plant in the West Indies. Dr. Bertoni says that it could be easily cultivated, although the best means of multiplication would be by cuttings, suckers, and division of the stalk, especially the latter, since cultivated plants have not produced much fertile seed.

Several plants are known which have uncommon properties in relation to the sense of taste in human beings. *Sideroxylon dulcificum*, A.DC., an African plant, bears oblong or oval berries about two-thirds the size of an olive, at first dull green, but changing to a dusky red as they ripen. The seeds are clothed externally by a thin, softish pulp, only slightly saccharine, yet imparting to the palate an extraordinary impression by which the most sour and acidulous substances become intensely sweet, so that citric or tartaric acids, lime juice, vinegar, and all immature fruit of a sourish character lose their unpleasant qualities, and taste as if they had been solely composed of saccharine matter. To a certain extent the duration of these effects depends upon the amount of berries chewed and the degree of maturity they have attained. They tend to lose their peculiar principle if suffered to remain in a ripe condition for any considerable time. The natives of the Gold Coast use the berries to render their stale and acidulated kankies more palatable and in bestowing a sweetness on sour palm-wine. No records of chemical analyses of this plant have been traced, but a description of it and an account of its distribution will be found in the *Kew Bulletin*, 1906, p. 171. *Thaumatococcus Danielli*, Benth., is said to have somewhat similar properties to those described for *Sideroxylon dulcificum*.

A plant with opposite properties is the Indian *Gymnema silvestre*, R. Br., a member of the Asclepiadaceae. It has a greenish flower and thick, fleshy leaves, and, like most of the plants of this order, it produces a milky juice. When the leaves are chewed, sweet and acrid tastes cannot be perceived for some hours afterwards. An account of the chemical analysis of the leaves and fruits is given in the Pharm. Journ., 1904, 19, p. 234. It is there shown that gymnemic acid is the substance which

affects the sense of taste. This is not a glucoside, but has very weak acidic properties and acts upon the nerves or nerve-endings of the tongue. The plant has no toxic properties and no cyanogenetic compounds have been discovered in it. A resinous substance, also of an acidic nature, which has been obtained from it, was devoid of any anti-saccharine properties. From the leaves a crystalline substance (a laevo-rotatory modification of quercitol) and a sugar (inactive glucose) were also extracted, but the fruits contain no quercitol. W. B. T.

Life and Letters of Sir Joseph Dalton Hooker.* — It is appropriate that Sir Joseph Hooker's life should have been written by his godson—the son of his old friend, T. H. Huxley. The task must have been one of almost filial duty, and Mr. Leonard Huxley is to be congratulated on the manner in which he has performed it. It can have been no light matter to select and arrange the letters of a man whose span of life and width of activities were so abnormal. So full is this correspondence that to a great extent Sir Joseph tells his own story, especially as most of the letters are written in a free unrestrained vein, thus conveying a more faithful portrait of the man than if his more formal utterances only had been given us. In order that these two volumes should be fully appreciated, it is as well to have at hand Darwin's "Life and Letters," and "More Letters," as also Mr. Leonard Huxley's life of his father. The lives of the three men were inextricably interwoven, and flowed along the same channels; they aimed at the same ideals and were lifelong friends.

Like Darwin and Huxley, Hooker began life with a medical training. All three, too, undertook memorable voyages to the southern seas. Though the medical training was afterwards most useful to him, Hooker never took to the profession, but merely qualified in order to be taken by Sir James Ross on his famous Antarctic voyage in the *Erebus*.

This was his first opportunity, and well did he make use of it. He laid the foundation of the great botanical career which was to make him famous, and obtained materials for the first of his classic works, the Flora of the Antarctic, New Zealand, and Tasmania. A few years after his return from this voyage he went out to India and explored the Sikkim regions of the Himalayas with a success which Rhododendron lovers know so well, and which implanted in him a desire to systematize the Flora of India, a work upon which he was occupied on and off for half a century; for the Flora Indica met with many checks and was not completed till 1897.

On his return, that connection with Kew began which was destined to be the main scene of his life's labours. His father had been appointed Director in 1841, and between them for over forty years they controlled the destinies of that famous establishment. By the public generally, indeed, Sir Joseph Hooker will be best remembered for his work at Kew. It has often been said

* "Life and letters of Sir Joseph Dalton Hooker, O.M., G.C.S.I." Based on materials collected and arranged by Lady Hooker. By Leonard Huxley. 2 vols. John Murray. 1918.

that Kew, as we know it, is the creation of the Hookers. And this is true, for, from 1840 until 1885 (indeed, till 1905, for Sir Joseph was succeeded by his son-in-law, Dr. Dyer) that influence was dominant. Hooker would have been the first to acknowledge that the great transformations which took place at Kew during his directorate were largely owing to the assistance he received from Dr. (afterwards Sir William) Thiselton-Dyer. Indeed, it would have been impossible for Hooker to have performed as efficiently as he did the countless duties which fall to the lot of a director outside his actual sphere, without that aid. Dr. Dyer combined, in an uncommon degree, administrative ability and artistic instinct, which were invaluable to his senior.

It is not merely that visitors may wander about and enjoy the amenities of a luxurious garden, and in spite of the fumes and fogs of London and a not very congenial soil, a vast collection of plants, both in the open and under glass, but that its prestige and associations draw young gardeners and botanists to gain experience there and then to be dispersed all over the world, especially to British Dependencies, where the development of economic resources is of such paramount importance. One has only to glance at the lists of the staff in various botanic establishments to see how wide-felt is the influence of Kew. Much of this is due to the administration of Hooker. He knew how to choose and manage his subordinates. He was constantly in the gardens himself; he planned and designed, and in spite of Government parsimony managed to get such edifices as the fine Temperate House built. It was, we believe, Sir William Harcourt who once told the House of Commons when opposing a vote of money to add to this building, that "a nation who wants a Navy must do without a greenhouse." But in spite of this, it was eventually completed, thanks to the influence of Joseph Chamberlain. Then there is the unrivalled Library and Herbarium, the nucleus of which was got together by Sir William Hooker, and purchased by the Government at his death. Both have been enormously added to since his day, and no arrangement or classification of plants can be successfully accomplished without reference to Kew. Other collections may be richer in some particulars, but for working purposes Kew far surpasses any establishment of the kind.

Hooker fought valiantly for this, as he did for all that concerned the Gardens. Yet amidst his endless engagements and never-ceasing outflow of scientific work, he was always ready to take visitors round, from the Emperor of Brazil, who inconsiderately arrived one morning at 6 o'clock, to parties of young children. For many years, too, he and Lady Hooker had summer parties at their house, to which all that was eminent in science and society was drawn.

But Kew was far from absorbing all his energies; he was almost as great a traveller as botanist. His travels in the Himalayas, Syria, Morocco, and North America, were all productive of either books or papers of great value, and led to his becoming the highest authority on plant distribution of his time, and it is perhaps for his work in this direction that science owes him its greatest debt.

To quote the words of a high authority:—

"Hooker stands out as the greatest authority the world has yet produced on the subject of the distribution of plants; although he did much other work, this alone confers on him immortality."

The subject, which Darwin once described as "almost the keystone of the laws of Creation," was one upon which Hooker constantly wrote. The two essays which stand out pre-eminently are "On the Distribution of Arctic Plants" (1860) and "The Introductory Essay to the Flora of Tasmania" (1861). These have been described as "only less epoch-making than the Origin itself." His addresses to the British Association at Nottingham in 1866 and York in 1881 also dealt with this question, but he gave the world no comprehensive work embodying his matured views. At one time, he more or less advocated the 'extensionist' theory of Forbes that imaginary sunk continents explained many of the problems of distribution, but later he shared the 'migrationist' views of Darwin and Wallace, of the permanence of continents, and that the solution of the difficulties of plant distribution lies rather in the direction of processes going on around us now—a view further strengthened by the more recent researches of Dr. Guppy.

Hooker was President of the Royal Society from 1873 till 1878; he told Darwin he did not want to be "crowned head of Science" and looked on it as "an awful honour"; nevertheless, his presidency was very successful, and marked by several important changes, such as the reduction of fees, and a more systematic classification of scientific papers. The arrangements, too, for the expeditions to observe the transits of Venus in 1875 and 1878, as well as for the famous *Challenger* expedition, passed through his hands.

Perhaps more important than all was his lifelong friendship with Darwin. Darwin repeatedly acknowledged his indebtedness to Hooker. "You will never know how much I owe to you and your constant kindness and encouragement," are the words which Darwin's son quotes in dedicating the two volumes of "More Letters" to Hooker, and again "for years I have looked on you as a man whose opinion I valued on any scientific subject more than anyone else in the world."

He was present, along with Huxley, at the memorable meeting of the British Association at Oxford in 1860, when Bishop Wilberforce poured his unctuous scorn on Darwin. The story is too well known to need repetition. Huxley's reply to the Bishop has become historical, and Hooker, who had come against his will and quite unprepared, was goaded by the Bishop's bad taste and mis-statements into making a speech, and "hit him" (as he put it) "in the wind." "Sam was shut up—had not one word to say in reply—and the meeting was dissolved forthwith, leaving you" he wrote to Darwin, "master of the field after four hours' battle."

Oxford, it may be recalled, was also the scene, with the same Bishop in the chair, four years later, of Disraeli's famous "ape or angel" speech. To this day opinion is divided as to whether it was intended to be taken seriously or as a pompous joke. At

Oxford, once more, thirty-four years later, with Huxley again present but not Hooker, the late Lord Salisbury, then President of the British Association as well as Chancellor of the University, saw fit to make somewhat cynical references to Darwinism. Hooker thought them silly, and hardly had patience to read them. "I really thought he had more gumption," was his comment. Very different was his estimate of Mr. Arthur Balfour's address at the Darwin celebration at Cambridge in 1909: "he grasped every salient point in Darwin's character, works, and their results on the progress of science and civilisation in a truly magic manner."

Of Hooker's 'magna opera,' the Genera Plantarum, which he collaborated with Bentham, stands first. It marked, as Mr. Huxley justly observes, an epoch in botany. To complain that it does not produce a new system is to misconceive its object, which was, as Professor Bower explains, "to codify the diagnosis of all the genera of flowering plants." Its value lies in the accurate definition of genera, not in their classification. And it may be noted here that Hooker did not share Engler's views on classification, though phyletically it is undoubtedly an advance; he regarded it "in the abstract as neither better nor worse than De Candolle's, and far more troublesome to apply for practical purposes." This is comforting to the many who hold that until Science can supply something nearer finality, it is better to adhere to a widely accepted and established arrangement.

The work which has conferred the next greatest blessing on botanists is the 'Index Kewensis.' It object was, to use Professor Bower's words, "to provide an authoritative list of all the names that have been used, with references to the author of each, and to its place of publication." The idea was Darwin's, and he and his family bore the chief expense. It was carried out by Dr. Daydon Jackson, under the supervision of Hooker, who read the proofs—some 2,500 pages containing 375,000 names. This work, like the Genera Plantarum, has met with some criticism by those who expect to find in it a solution of vexed questions of nomenclature, but this is, of course, outside its scope. It does, however, form a guide of incalculable assistance to botanists, and it is satisfactory to record that four supplements have been issued since the work was first published, and that the work is being continued at Kew.

Of Hooker's powers as a descriptive writer we have ample evidence in his "Himalayan Journals," which has been justly described as one of the best books of travel ever written. One passage in a letter to his father, written from Tasmania, must be quoted; it makes us wish he had also embodied his Antarctic experiences in a book:—"At one time we thought we were really going on to the true South Pole, when we were brought up by the land turning from S. to E., where there was a fine volcano spouting fire and smoke in 79° S., covered all over with eternal snow, except just round the crater where the heat had melted it off. I can give you no idea of the glorious views we have here, they are stupendous and imposing, especially when there is any fine weather, with the sun never setting, among huge bergs, the water and sky both as blue, or rather more intensely blue than

I have ever seen it in the Tropics, and all the coast one mass of beautiful peaks of snow, and when the sun gets low they reflect the most brilliant tints of gold and yellow and scarlet, and then to see the dark cloud of smoke tinged with flame rising from the volcano in one column, one side jet black and the other reflecting the colours of the sun, turning off at a right angle by some current of wind and extending many miles to leeward; it is a sight far exceeding anything I could imagine and which is very much heightened by the idea that we have penetrated far farther than was once thought practicable, and there is a sort of awe that steals over us all in considering our own total insignificance and helplessness."

Fifty-six years later, when he witnessed the illuminated Fleet at Spithead, he declared he had seen but two sights to beat it, one was "the view of the glacier-clothed and berg-imprisoned mountain chain of South Victoria Land and Mount Erebus blazing in front. The other, the first view of the Himalayas, as seen from Darjeeling, covering perhaps 100° of one of the horizons with perpetual snow, with Kinchinjunga, 28,000 ft., towering over all."

Hooker was one of those men who had the gift of making great and lasting friendships; as a young man he quickly won the confidence of men like Sir James Ross and Lord Dalhousie, who encouraged his early efforts, and stimulated his zeal. To Henslow, his father-in-law, he was devoted, and it would be impossible to overestimate the value of his intimacy with Darwin and Huxley, already alluded to. "I have never known a man more genuinely beloved, and deservedly so," writes Mrs. Bewicke, "so child-like and ingenuous he was and so really modest, always putting others before himself, always unconscious of his own importance." He possessed pre-eminently the gift of making friends, and his correspondence shows how diligently he kept up with them, and how warmly they reciprocated his friendship. Alas! this tenderness of heart caused him many a bitter pang at parting as old age advanced. It is pathetic to read of the X Club, which kept together so long, at last dwindling away. One by one the old friends dropped off, the blanks were never filled, and the Club silently ceased to exist.

His love for his family was no less marked, he took the deepest interest in their welfare and upbringing, as the 'Lion letters' testify. These personal touches give an invaluable insight into Hooker's character.

Though in early life he did not enjoy particularly good health, his travels in the Antarctic, in the Himalayas, in Morocco, and in North America seem to have hardened him, and he became stronger as life advanced. "I am stoneware, you know," he wrote to Huxley, when nearing 80, "and shall have to be buried alive, if at all, I suppose." Except for occasional attacks of ailments, to which he was subject, he lived to enjoy a serene and robust old age, and retained his faculties in a wonderful degree to the last. Those who saw him at the Darwin celebrations at Cambridge in 1909 found it hard to realize that he was 92 years of age.

He was capable of enduring great physical fatigue. "I hope you will inherit my powers of walking," he once wrote to his son: "when I was a youth of 20 I thought nothing of 30 miles and have done 60 in the day." He was also endowed with indomitable industry and perseverance, and could work with but short intervals for sleep. He disliked public functions, and above all public speeches and lecturing, but when occasion demanded he showed that he was by no means deficient in these respects.

With Government officials his method was to persevere till he got his way. These pages disclose once more the details of his unfortunate quarrel with the redoubtable Mr. Ayrton, which disturbed many years of his life.

Mr. Ayrton, oddly enough, was born at Kew, and had had a long experience in India, but this did not prevent an acrid animosity towards Hooker. Mr. Ayrton was once described by Mr. Gladstone as the cleverest man in the House of Commons; he may have been, but he was certainly one of the most disagreeable. His dominating idea seems to have been to keep those under him in their places, especially "glorified gardeners." His conflict with Hooker eventually reached the House of Commons, but in spite of the intervention of Mr. Gladstone, and subsequent attempts of Sir Algernon West to pour oil on the troubled waters, no satisfactory conclusion was arrived at, and bad blood existed between the two men until, some years later, Ayrton was removed to another office. No wonder Hooker welcomed Mr. Mitford at the Office of Works; a man so much after his own heart was naturally drawn into a warm friendship, which was kept up with increasing intimacy long after both had retired from official life.

A word may here be said as to Hooker's political views. He never took any active part in politics, and allusions to current questions in his letters are not very numerous. His biographer tells us he was a "philosophical Conservative," whatever that may mean, "a strong Unionist, but not a Tory." "He disbelieved in the egalitarian tendencies of reforming Radicalism as emphatically as in the true Tory's impenetrability to ideas." He seems to have got on very well with Mr. Gladstone (with whom he shared a passion for Wedgwoods), in spite of the Ayrton trouble; and at the one recorded interview with Disraeli, he showed that he could be 'beautifully diplomatic,' and carried his point (a pension for Fitch), playing on the great man's imperialist feelings by showing him drawings of the Victoria Regia Lily!

His opinion of Government Departments was not more severe than one might expect from one who had endured Ayrton. "My experience of Public Departments is," he wrote to Darwin, "that they are riddled with small defects, and much idleness—and that in many respects they want overhauling—but not all," and "we are apt to forget that if red-tape has prejudice on its side, it also has experience."

As further evidence of the shrewd view he took of public affairs, it is impossible, at the present juncture, to refrain from quoting what he wrote to Mr. E. Darwin in 1893:—"I am

dreamer enough to look for a time when America will forbid a European war! What a splendid rôle this would be for a nation to undertake—to send us all to our tents and tell us that we may snarl at one another in the length and breadth of Europe as much as we please but nothing more, and that if we go further she will intervene." And in 1890 he wrote:—"Bismarck was not the only man of blood and iron in Germany; the whole of Prussia breathes arrogance, and this chirrupy young Emperor will soon be the tool of faction. He evidently has no conception of the difficulties and dangers of his position."

Such are some of the reflections which emerge from a perusal of the life and letters of this great man, for great he undoubtedly was, great in science, and great in character and achievement. It would have been a fitting culmination to an illustrious and honourable career if, as was proposed, he had been laid in Westminster Abbey beside Newton and Lyell and Darwin; but he wished for Kew, where his father was buried; and there, near the glades and dells he created, hard by the scene of his life's work, he was laid to rest, full of years, of honours, and of fame.

GERALD W. E. LODER.

Species Blancoanae.*—It is fortunate that the task of a critical review and interpretation of Blanco's *Flora de Filipinas* should have been undertaken by so competent an authority on the Philippine Flora as Prof. E. D. Merrill, whose knowledge of the vegetation of that archipelago, gained since the year 1902, is unrivalled. Just as Rumphius's *Herbarium Amboinense* (*see K.B.* 1918, p. 244) is of fundamental importance to students of Malayan botany and to a less extent of certain other parts of the world, so is Blanco's Flora in the case of the Philippine Islands. The first edition of Blanco was published in Manila in 1837, and contained descriptions, entirely in Spanish, of about 903 species of plants. A second edition containing 1,132 species under Latin binomials, and 27 under native names, appeared just after Blanco's death in April, 1845. Yet a third edition, greatly extended and illustrated, by Fathers Fernandez-Villar and Naves, appeared during the period 1877-1883, and it is this last edition which has given most trouble to Prof. Merrill, for reasons which are clearly stated.

Blanco's work is not merely a "botanical curiosity"† as it appeared to botanists of the middle of last century. It is the work of a man who had neither instructors nor herbaria, and whose literature at first was limited to the *Systema Vegetabilium* of Linnaeus! As Prof. Merrill says, "Few botanists in any country or in any time have laboured under greater disadvantages, and Blanco must be credited with initiative, industry and perseverance. Most of the facts recorded are the result of his own observation, and if he did make numerous grave errors in interpre-

* Species Blancoanae; a critical revision of the Philippine species of plants described by Blanco and Llanos, by E. D. Merrill; 423 pp. and a map; Manila Bureau of Printing, June 15, 1918.

† Hooker and Thomson, *Flora Indica, Introd. Essay*, 56 (1855).

tation of species, his descriptions, as such, on the whole compare favourably with those of his contemporaries. . . . Unfortunately Blanco preserved no herbarium material, and his species must be interpreted solely by the published data."

Prof. Merrill has found that Blanco frequently described the same species twice, or sometimes three or even four times, under different specific or generic names. In about 143 cases reductions have been made in this connection, so that the total number of different species actually described by Blanco amounted to about 993. Six hundred and ninety of these species were attributed to binomials of other authors on the assumption that they were the same. Prof. Merrill finds that about 60 per cent. of these determinations were incorrect. The vast amount of accumulated material of the Philippine flora and the author's own intensive knowledge have made it possible for him to determine the status of a very high percentage of Blanco's species. In this work Prof. Merrill seems to have derived more assistance from the vernacular names and uses of the plants than from the actual descriptions. For instance, no botanist, except perhaps by laborious exclusion, could ever have found out from the description of *Rhamnus lando*, Llanos, that a species of *Embelia* (*Myrsinaceae*) was intended. The native name *lando* was the key to it. Whenever possible he has interpreted a Blancoan species by specimens originating as near as possible from the exact quoted locality, that is by *topotypes*. An *exsiccata* of 16 sets of these has been prepared with a view to distribution to a selected list of botanical institutions in various countries. For this *exsiccata* the title *Species Blancoanae* has been selected. Reference to one of these sets will be incumbent on all students of Philippine and Malayan botany, and its arrival in Europe, postponed until more propitious times, will be awaited with considerable interest. By its means, monographers will no doubt now be able to account for many of Blanco's species, which in its absence would have been relegated to that most unsatisfactory group at the end—the "imperfectly known."

Prof. Merrill is to be warmly congratulated for a work which will be invaluable to all students of taxonomic and geographical botany of the Malay Archipelago. J. H.